GAINESVILLE RENEWABLE ENERGY CENTER
Gainesville, FL

FACILITY PERFORMANCE TEST REPORT

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EXECUTIVE SUMMARY

Facility and Boiler Performance Testing was conducted at The American Renewables, Gainesville Renewable Energy Center Project, located in Gainesville Florida for Fagen Industrial, Inc. Testing was conducted based on the schedule provided in Table E-1. The Plant has a net output of 101.5 MW fired by biomass.

Table E-1: Testing Schedule

Date	Start Time	End Time	Test Name
11/21/13	10:00	14:00	Plant Test Run #1
11/21/13	14:00	18:00	Plant Test Run #2
11/21/13	18:00	22:00	Plant Test Run #3

Testing was executed in general accordance with Revision 1 of the Facility Performance Test Procedure (dated August 9, 2013), ASME PTC 46- 1996, and ASME PTC4-2008. There are several exceptions and clarifications to the Test Procedure. These can be characterized as method/sampling related and, data/measurement related. See Section 2.2 of this report for additional details on these as tested changes to the Test Procedure.

Tables E-2 and E-3 provide a summary of the test results for the performance tests.

Table E-2: Plant Performance Test Results

Description	Units	Test Run 1	Test Run 2	Test Run 3	Average
Plant Electrical Output					
Guaranteed Plant Electrical Output	kW	101,520	101,520	101,520	101,520
Measured Plant Electrical Output	kW	102,884	102,916	102,943	102,915
Corrected Plant Electrical Output	**kW**	**101,325**	**101,431**	**101,037**	**101,264**
Margin from Guarantee	kW	-195	-89	-483	-256
	%	-0.19	-0.09	-0.48	-0.25
Plant Cycle Heat Rate					
Guaranteed Plant Cycle Heat Rate	Btu/kWh	12,559	12,559	12,559	12,559
Measured Plant Cycle Heat Rate	Btu/kWh	11,368	11,333	11,339	11,347
Corrected Plant Cycle Heat Rate	**Btu/kWh**	**11,857**	**11,860**	**11,834**	**11,850**
Margin from Guarantee	Btu/kWh	-702	-699	-725	-709
	%	-5.59	-5.56	-5.77	-5.64

Table E-3: Boiler Performance Test Results

Description	Units	Test Run 1	Test Run 2	Test Run 3	Average
Boiler Steam Output					
Guaranteed Boiler Steam Output	lb/hr	907,640	907,640	907,640	907,640
Measured Plant Steam Flow	lb/hr	878,834	879,189	874,726	877,583
Corrected Plant Steam Flow	**lb/hr**	**870,045**	**870,397**	**865,979**	**868,807**
Margin from Guarantee	lb/hr	-37,594	-37,243	-41,661	-38,833
	%	-4.14	-4.10	-4.59	-4.28
Fuel Heat Input					
Guaranteed Fuel Heat Input	mmBtu/hr	1,275	1,275	1,275	1,275
Measured Fuel Heat Input	mmBtu/hr	1,170	1,166	1,167	1,167
Corrected Fuel Heat Input	**mmBtu/hr**	**1,206**	**1,207**	**1,202**	**1,205**
Margin from Guarantee	mmBtu/hr	-69	-68	-73	-70
	%	-5.37	-5.31	-5.74	-5.48
Auxiliary Power Consumption					
Guaranteed Aux. Power Load	kW	6,100	6,100	6,100	6,100
Measured Aux. Power Load	kW	5,493	5,501	5,303	5,432
Corrected Aux. Power Load	**kW**	**5,089**	**5,071**	**4,935**	**5,031**
Margin from Guarantee	kW	-1,011	-1,029	-1,165	-1,069
	%	-16.58	-16.87	-19.10	-17.52
Steam Temperature at Outlet					
Guaranteed Outlet Temperature	°F	1,005	1,005	1,005	1,005
Measured Outlet Temperature	**°F**	**998.4**	**998.7**	**998.8**	**998.7**
Margin from Guarantee	°F	-6.6	-6.3	-6.2	-6.3
	%	-0.65	-0.63	-0.62	-0.63

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1.0 Introduction

1.1 Plant Description

The American Renewables, Gainesville Renewable Energy Center Project, located in Gainesville Florida is a 100 MW biomass fueled plant. The facility consists of one (1) Metso bubbling Fluid Bed solid biomass fuel boiler producing steam for one (1) Siemens steam turbine generator (STG). The facility is owned and operated by Gainesville Renewable Energy Center (GREC).

1.2 Testing Goal

Overall Facility Testing was conducted to determine Plant Net Capacity, and Plant Net Heat Rate. Testing was conducted in general agreement with ASME PTC 46-1996 and Revision 1 of the PTC 46 Facility Performance Test Procedure. Exceptions to the Test Procedure are discussed in Section 2.2.

Additionally, Boiler performance testing was conducted concurrently to evaluate the boiler performance guarantees listed in the GREC Boiler EPC Contract Appendix VI for Steam Output at Superheater Outlet, Boiler Fuel Heat Input, Auxiliary Power Consumption, and Steam Temperature at Superheater Outlet. These items were tested in general accordance with ASME PTC4-2008 and the Facility test procedure.

1.3 Parties to the Test

Parties to the test are representatives or designees who were present during the test, and have the authority to agree in writing to changes to the Test Procedure. The major corporate Parties to the test are listed below. A listing of Test Party Representatives present during the testing is provided in the testing checklists located in Appendix A.2.

Owner:	Gainesville Renewable Energy Center
Contractor:	Fagan Inc.
Testing Subcontractor:	McHale & Associates, Inc.
Independent Engineer:	Black and Veatch
Lenders:	Union Bank, Bank of Tokyo – Mitsubishi UFI limited

1.4 Test Witness

In addition to the primary parties to the test listed above, secondary Parties may have provided a representative to be available during testing. These representatives may provide technical feedback to support the testing, but may not have the authority to confirm or approve any test deviations. The major potential witnesses to the test are listed below. A listing of the actual Test Witnesses present during the testing is provided in the testing checklists located in Appendix A.2.

Boiler Manufacturer:	Metso Power
STG Manufacturer:	Siemens

2.0 Test Description

Facility Performance Testing was conducted at Gainesville Renewable Energy Center (GREC) in Gainesville, FL by McHale and Associates for Fagen. Testing was conducted in accordance with the schedule shown in Table 2-1.

Table 2-1: Testing Schedule

Date	Start Time	End Time	Test Name
11/21/13	10:00	14:00	Plant Test Run #1
11/21/13	14:00	18:00	Plant Test Run #2
11/21/13	18:00	22:00	Plant Test Run #3

2.1 Referenced Test Codes and Standards

- ASME PTC 46 1996 Performance Test Code on Overall Plant Performance
- ASME PTC 1 2011 General Instructions
- ASME PTC 4 2008 Fired Steam Generators
- ASME PTC 4.1 (R)1991 Steam Generating Units
- ASME PTC 4.3 (R)1991 Air Heaters
- ASME PTC 6 2004 Steam Turbines
- ASME PTC 19.1 2005 Test Uncertainty
- ASME PTC 19.2 2010 Pressure Measurement Instruments and Apparatus Supplement
- ASME PTC 19.3 (R)2004 Temperature Measurement Instruments and Apparatus
- ASME PTC 19.5 2004 Flow Measurement
- ASME PTC 19.7 (R)1988 Measurement of Shaft Power Instruments and Apparatus
- ASME PTC 19.10 1981 Flue and Exhaust Gas Analyses Instruments and Apparatus
- ASME PTC 19.22 2007 Data Acquisition Systems
- ASME PTC 25 2008 Pressure Relief Devices
- ASME MFC-2M 1983 Measurement Uncertainty for Fluid Flow in Closed Conduits
- ASME MFC-3M 2004 Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi
- ASTM D3761 2010 Standard Test Method for Total Fluorine in Coal by the Oxygen Bomb Combustion/Ion Selective Electrode Method
- ASTM D7348 2013 Standard Test Methods for Loss on Ignition (LOI) of Solid Combustion Residues
- ASTM D7582 2012 Standard Test Methods for Proximate Analysis of Coal and Coke by Macro Thermogravimetric Analysis

• BSI	ASTM D6722	2012	Standard Test Method for Total Mercury in Coal and Coal Combustion Residues by Direct Combustion Analysis
• BSI	EN 14774-1	2010	Solid Biofuels – Determination of Moisture Content – Oven Dry Method Part 1: Total Moisture – Reference Method
• BSI	EN 14775	2010	Solid Biofuels - Determination of Ash Content
• BSI	EN 14778	2011	Solid Biofuels – Sampling
• BSI	EN 14780	2011	Solid Biofuels – Sample Preparation
• BSI	EN 14918	2010	Solid Biofuels – Determination of Calorific Value
• BSI	EN 15104	2011	Solid Biofuels – Determination of Total Content of Carbon, Hydrogen and Nitrogen – Instrumental Methods
• BSI	EN 15148	2010	Solid Biofuels – Determination of the Content of Volatile Matter
• BSI	EN 15149-2	2010	Solid Biofuels – Determination of Particle Size Distribution. Vibrating Screen Method Using Sieve Apertures of 3.15 mm and Below.
• BSI	EN 15289	2011	Solid Biofuels – Determination of Total Content of Sulfur and Chlorine
• BSI	EN 15290	2011	Solid Biofuels – Determination of Major Elements – Al, Ca, Fe, Mg, P, K, Si, Na and Ti
• BSI	EN 15297	2011	Solid biofuels. Determination of minor elements. As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn
• ISO	540	2008	Hard coal and coke -- Determination of ash fusibility
• IEEE	120	(R)2007	Master Test Guide for Electrical Measurements in Power Circuits

2.2 Test Exceptions

Test exceptions are items identified at the time of the test execution or afterwards during the detailed post-test computations and data analysis that differ from the methods described in the Test Procedure. The following is a brief description and discussion for each of the identified Test Exceptions by category.

2.2.1 Test Load Clarification

2.2.1.1 During the performance test, the turbine throttle control valve was chattering substantially. As a result of this valve operation, it was decided not to increase the test load any further than necessary.

2.2.2 Method/Sampling Related Exceptions

2.2.2.1 Section 3.2.4 of the Test Procedure called for four (4) test runs of three (3) hours duration each. During a pre-test meeting the Test Parties agreed to change this to three (3) test runs of four (4) hours duration each.

2.2.2.2 Table 3-4 of the Test procedure provided Stability Criteria for the test. The test procedure also called for the Test Parties to agree to proceed with the testing if these criteria could not be met. It was found prior to the test start that the unit could not achieve the main steam pressure and boiler oxygen level stability criteria. As the unit was found to be operating normally it was agreed to proceed with the testing despite not achieving these two stability criteria.

2.2.2.3 Supplied in Appendix A.2 of this report is an annotated copy of Pre-Test Check List. This list was originally provided in the Test Procedure, Appendix D.1 and provides in Section E of the check list an expected test "Systems Not In Operation" list. On it "Auxiliary Steam (except SJAE)" is listed. The note against this item indicates that the "Brine System Steam" also remained in service. The Brine System Steam flow rate is unmeasured. The effect of Brine Steam flow, if corrected for, would be to improve the turbine's tested (corrected) performance.

2.2.2.4 In Section 4.3.1.2 of the Test Procedure it details how the fuel sampling is to be performed and the quantity of samples that were to be collected. Due to a very constrained sampler volume size, the number of samples and the total quantity of sample collected had to be revised. Thus only a single sample was available for each 12 minute sampling period and a single composite sample per test run which was divided into 5 samples for distribution to the Test Parties.

2.2.2.5 Test Procedure Section 4.3.1 details how fuel sampling will be performed and how it will be analyzed. Due to Emissions Testing that was in progress during the test runs requiring additional analysis and the apparent stability of the fuel based on operating parameters, the Test Parties decided to revise which fuel samples were to be analyzed and for what. Instead of analyzing each 12 minute sample for Higher Heating Value,

Moisture and Particle Size, only about every other sample was so analyzed and none for Particle Size. Additionally, every sample at the top of the hour was tested for Ultimate Analysis.

2.2.2.6 In Section 4.3.2.1 of the Test Procedure it states that boiler ash will be sampled near the ash silo entrance. To allow normal operation of the ash sampling system, samples were collected individually from the Ash Bottom Refuse Hopper, the 2nd Pass Ash Hopper (economizer), the 3rd Pass Hoppers and Bag House Hoppers. Each location's sample was independently analyzed.

2.2.2.7 In Section 4.3.2.2 of the Test Procedure details how and for what the boiler ash is to be analyzed for. Prior to the start of the test the Parties choose to adjust for what and how the boiler ash was to be analyzed. Following the test, and in review of the ash analysis results for the LOI at 550 Deg C, it was determined that this temperature was not producing sensible results and appeared that some component of the ash was likely oxidizing at this temperature. As a result, the LOI analysis was conducted at 750 Deg C to determine the quantity of unburned combustibles in the ash.

2.2.2.8 The 3rd pass ash sample was not retested at 750 Deg C due to its small mass flow in proportion to the rest of the unit's ash flows. 2nd pass ash sample results were used as a substitute to the 3rd pass values.

2.2.2.9 Ash analysis was limited to just LOI. Test Parties agreed to forgo detailed ash analysis and design estimates were used in their stead.

2.2.2.10 In Section 4.3.3 of the Test Procedure it calls for Sodium Bicarbonate, if injection is in service, to be sampled once per test run. The Test Parties chose not to do so but to just use the assay analysis from the last bulk material delivery to the site.

2.2.3 Data/Measurement Related Exceptions

2.2.3.1 Prior to testing, the temporary temperature and oxygen grid was installed at the exit of the economizer instead of the baghouse inlet as described in the procedure. As assumption of zero air infiltration between the economizer and the baghouse inlet was made, and DCS measurements were intended to be used to capture the baghouse inlet temperature. The baghouse inlet temperature is further discussed in Section 2.2.4.1.

2.2.3.2 During Test Run #1, the temporary DAS system suffered a cable failure resulting in the loss of data being collected from the ID Fan Inlet temperature grid between 11:28 and 13:11. As a result of trouble shooting this failure data collection from the economizer outlet temperature grid was also lost between 12:28 and 12:51. Rather than restart the test it was decided to continue on and replace the lost primary (temporary) data with secondary (DCS) data values for the gap periods.

2.2.3.3 The test procedure Section 3.5.5 states that the emissions shall be monitored by a certified CEM system of independent emission testing. Concurrent to the performance

test, the CEM system was undergoing certification testing. The data and results of the certification is discussed under a separate test report by a separate emission testing group. The data recorded from the CEM system is provided in Table 2-2 below for information only.

Table 2-2: CEM System Average Data During Testing

DESCRIPTION	UNITS	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
CEMS NOX, STACK	lb/MMBtu	0.0496	0.0500	0.0502	**0.0499**
CEMS CO, STACK	lb/MMBtu	0.0259	0.0283	0.0256	**0.0266**
FLUE GAS SO2, STACK	lb/MMBtu	-0.0005	-0.0005	-0.0004	**-0.0005**
CEMS O2, STACK	%	3.2200	3.2676	3.2757	**3.2544**
CEMS HCL, STACK	ppm	0.0040	0.0000	0.0001	**0.0014**
CEMS HF, STACK	ppm	-0.0005	-0.0004	-0.0005	**-0.0005**
CEMS FLOW, STACK	klb/hr	18,172	18,211	18,067	**18,150**

2.2.3.4 The Test Procedure in Section 4.1.10 calls for Manual Readings to be collected once every 15 minutes. Bottom Ash Cooling Water Temperature was to be manually collected. During Test Run # 1 this was not accomplished and in fact no reading for this temperature was collected. Data from the second and third test runs was used to estimate this value for the first test run.

2.2.3.5 MDAS measurements of the ID fan inlet O2 were found to result in unrealistic results. Upon further inspection, it appears that the analyzer calibration likely drifted through the performance test. Using an energy balance around the baghouse and NH3 vaporizing air confirms that the CEMS data at the stack predicts an expected amount of air entering the gas stream through the baghouse. The CEMS measurement of O2 at the stack shall be used in the calculation of the test results.

2.2.4 Calculation Related Exceptions

2.2.4.1 In conducting an energy balance around the baghouse and SCR using the measured data, the energy in the dry gas exiting the baghouse appeared to be greater than the energy in the dry gas entering the baghouse. An energy balance was used to calculate the baghouse gas inlet temperature using the assumption that the test heat loss through the baghouse is equal to design.

2.2.4.2 Test conditions are outside of the range for the corrections provided by Metso. In the extrapolation fo the test results using these curves, the results did not match the expected results using a PTC4 correction methodology. Upon further inspection, when

entering the boiler predicted performance data from the manufacturer at the curve points for 98% MCR at 50%, 45%, and 40% moisture, the correction curve behavior does not match the predicted performance data. The results of the performance test herein are based upon the PTC 4 correction methodology instead of the Metso corrections.

2.3 Boiler Performance Testing Discussion

2.3.1 During the performance test, additional test measurements and calculations were conducted to evaluate the boiler performance guarantees in accordance with the GREC Boiler EPC Contract Appendix VI. The Performance Guarantee and Basis conditions for these parameters are presented in Table 2-3 below. These test parameters were determined in accordance with the Facility Test Procedure with the exceptions and clarifications listed in this report.

Table 2-3: GREC Boiler EPC Contract Appendix VI
Performance Guarantee for Boiler Island

Category	Performance Guarantee	Basis Conditions
Steam Output at Superheater Outlet	907,640 lbs/hr	440 Deg F feed water with 1% allowance for continuous blowdown based on Guarantee basis fuel
Boiler Fuel Heat Input	1,275 mmBtu/hr	Siemens Turbine 907,640 lb/hr main steam flow 440 Deg F feed water temperature 45% moisture content based on Guarantee basis fuel 1% blowdown 77 Deg F recerence temperature 80 Deg F ambient air temperature 0.0204 lb H2O/ lb dry air absolute air humidity (80 Deg F dry/78 Deg F wet bulb)
Auxiliary Power Consumption	6,100 kW	Guarantee basis fuel, Including: Primary Air Fan Secondary Air Fan Induced Draft Fan Flue Gas Recirculation Fan Fuel Feeding Equipment Bag House Filter Cleaning Air Compressor and Hopper Heating System Dry Sorbent Injection System Activated Carbon Injection System
Steam Temperature at Superheater Outlet	1,005 Deg F	For 70% to 100% MCR at 1,620 psig based on Guarantee Basis Fuel.

2.3.2 Pretest activities for the boiler testing were conducted in accordance with the facility performance test procedure. Specifically, this includes Sections 2, 3 and 4 of the facility test procedure.

2.3.3 In the measurements a power factor of 0.707 was assumed in the calculations of the Boiler and Fuel Yard Auxiliary Power Consumption.

2.3.4 Boiler calculations were performed in accordance with the facility test procedure for determination of the PTC4 energy balance. This methodology is discussed in more detail within Section 4 herein.

2.3.5 A pre-test uncertainty was not established for any of the boiler performance guarantees.

3.0 Test Measurements

Test measurements were based on a combination of temporary test instrumentation and permanent station instrumentation. Raw test data was provided to all Parties following the test. Electronic files of this data are provided in Appendix A.1. Test averages are provided for each measurement point in the Input Summary Table at the end of Section 3. The Input Summary provides measurement descriptions, average values for each parameter, accounting for the Test Exceptions described in Section 2.2 for each test run, and an average for the overall test.

3.1 Boiler Auxiliary Load

3.1.1 Table 3-1 below presents the list of measurement parameters utilized in the evaluation of the boiler auxiliary loads.

Table 3-1: Boiler Auxiliary Load Consumers

Measurement Description	Measurement Tag	Measurement Tag
	Power (kW)	
PA Fan Real Power	PRY-1011A EMA-JI-1011-12	
SA Fan Real Power	PRY-1019A EMA-JI-1019-12	
ID Fan Real Power	PRY-1010A EMA-JI-1010-12	
FGR Fan Real Power	PRY-1021A EMA-JI-1021-12	
	Current (Amps)	**Voltage (Volts)**
Fuel Feed Left Drag Conveyor 1	FCS-CNV-1008	FCS-CNV-1008
Fuel Feed Right Drag Conveyor 1	FCS-CNV-1009	FCS-CNV-1009
Fuel Feed Left Metering Screw 1	FCS-CNV-1010	FCS-CNV-1010
Fuel Feed Right Metering Screw 1	FCS-CNV-1011	FCS-CNV-1011
Fuel Feed Left Metering Screw 2	FCS-CNV-1012	FCS-CNV-1012
Fuel Feed Right Metering Screw 2	FCS-CNV-1013	FCS-CNV-1013
Fuel Feed Left Metering Screw 3	FCS-CNV-1014	FCS-CNV-1014
Fuel Feed Right Metering Screw 3	FCS-CNV-1015	FCS-CNV-1015
Fuel Silo 1 Reclaimer	FCS-CNV-1016	FCS-CNV-1016
Fuel Silo 2 Reclaimer	FCS-CNV-1017	FCS-CNV-1017
Fuel Feed Left Rotary Feeder 1	FCS-RTF-1022	FCS-RTF-1022
Fuel Feed Left Rotary Feeder 2	FCS-RTF-1023	FCS-RTF-1023
Fuel Feed Left Rotary Feeder 3	FCS-RTF-1024	FCS-RTF-1024
Fuel Feed Right Rotary Feeder 1	FCS-RTF-1025	FCS-RTF-1025
Fuel Feed Right Rotary Feeder 2	FCS-RTF-1026	FCS-RTF-1026
Fuel Feed Right Rotary Feeder 3	FCS-RTF-1027	FCS-RTF-1027
Fuel Silo 1 Lube Unit	FCS-SP-1018	FCS-SP-1018
Fuel Silo 2 Lube Unit	FCS-SP-1020	FCS-SP-1020
Fuel Silo 1 Rotating Spreader	FCS-SP-1030	FCS-SP-1030
Fuel Silo 2 Rotating Spreader	FCS-SP-1031	FCS-SP-1031
Fuel Silo 1 Turn Device	FCS-TG-1032-A	FCS-TG-1032-A
Fuel Silo 1 Turn Device	FCS-TG-1032-B	FCS-TG-1032-B
Fuel Silo 2 Turn Device	FCS-TG-1033-A	FCS-TG-1033-A

Fuel Silo 2 Turn Device	FCS-TG-1033-B	FCS-TG-1033-B
Baghouse Air Dryer 1	FFC-AD-1061	FFC-AD-1061
Baghouse Air Dryer 2	FFC-AD-1064	FFC-AD-1064
Baghouse Air Compressor 1	FFC-CR-1060	FFC-CR-1060
Baghouse Air Compressor 2	FFC-CR-1063	FFC-CR-1063
Sodium Bicarbonate Air Blower 1	SBC-FN-1014	SBC-FN-1014
Sodium Bicarbonate Rotary Airlock 1	SBC-RTF-1002	SBC-RTF-1002
Dust Collector #2 Fan	FHS-MR-0039-01	FHS-MR-0039-01
Dust Collector #2	FHS-MR-0039-02	FHS-MR-0039-02
Dust Collector #3 Fan	FHS-MR-0040	FHS-MR-0040
Conveyor #10 Drive #1	FHS-MR-0038-01	FHS-MR-0038-01
Conveyor #9 Drive #1	FHS-MR-0036-01	FHS-MR-0036-01

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
PRIMARY VARIABLES FOR CREDITS AND LOSSES CALCULATIONS							
Ambient Data							
Barometric Pressure	psia	Pa	**14.58**	14.74	14.73	14.74	**14.74**
Ambient Relative Humidity	%	Rhm	92%	79%	83%	85%	**83%**
Ambient Specific Humidity	lbm H2O/lbm	MFrDA	0.0205	0.0146	0.0157	0.0134	**0.0146**
Ambient Dry Bulb Temperature	Deg F	TA6d	**80.0**	74.7	75.3	70.1	**73.4**
Ambient Wet Bulb Temperature			**78.0**	69.9	71.5	66.9	**69.4**
Cooling Tower Wet Bulb Temperature			**78.0**	68.4	69.9	65.2	**67.8**
Enthalpy Reference Temperature	Deg F	TRe	**77.0**	**77.0**	**77.0**	**77.0**	**77.0**
Economizer							
Economizer Flue Gas O2	%	DvpO2 (14)	**2.88**	2.88	2.86	2.86	**2.87**
Economizer Flue Gas Exit Temperature	Deg F	T14	**498.0**	491.9	493.4	493.8	**493.0**
Air Heater Data							
Average FD Fan Outlet Temperature (SCAH Inlet)	Deg F	TA7		66.3	68.5	60.9	**65.2**
Average PA Fan Outlet Temperature (SCAH Inlet)	Deg F	TA7A		97.7	98.9	91.8	**96.1**
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	Deg F	TFgEn (14C)	**498.0**	491.9	493.4	493.8	**493.0**
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)			**452.0**	426.9	431.7	428.7	**429.1**
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)			**430.0**	402.7	407.7	405.0	**405.2**
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	Deg F	TFgLv (15)	**316.0**	307.9	309.0	309.7	**308.9**
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	Deg F	TA8C	**107.0**	108.4	107.5	106.4	**107.4**
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)			**379.7**	357.3	357.9	357.4	**357.5**
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)			**379.7**	357.3	357.9	357.4	**357.5**
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	Deg F	TA9A	**472.0**	441.5	442.6	442.3	**442.1**
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	Deg F	TA8B	**152.0**	155.1	154.9	155.0	**155.0**
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)			**372.4**	356.4	357.8	358.0	**357.4**
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)			**372.4**	356.4	357.8	358.0	**357.4**
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	Deg F	TA9	**447.0**	424.5	426.4	426.7	**425.9**
Average Flue Gas Recirculation Temperature			**366.0**	367.5	368.6	369.3	**368.5**
Primary Air Heater Flue Gas Compostion							
Dry Basis			**Dry Basis**	**Dry Basis**	**Dry Basis**	**Dry Basis**	
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	%	vpO2En (14(	**2.88**	2.88	2.86	2.86	**2.87**
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	%	DvPCO2	**16.50**	17.85	17.83	17.92	**17.86**
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	%	DvPO2Lv	**3.76**	3.95	3.91	3.91	**3.92**
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	%		**15.62**	15.86	16.34	16.00	**16.07**
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	ppm	DvpCO	**145.00**	29.69	26.67	25.10	**27.15**
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	ppm		**155.00**	155.00	155.00	155.00	**155.00**
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	ppm	DvPSO2	**138.00**	138.00	138.00	138.00	**138.00**
Ash and Fuel Temperatures							
Fuel Temperature	Deg F	T	**80.1**	**95.0**	95.0	95.0	**95.0**
Sorbent Temperature	Deg F	T1	**80.0**	74.7	75.3	70.1	**73.4**
Sand Temperature	Deg F	T2	**80.0**	74.7	75.3	70.1	**73.4**
Bottom Ash Temperature	Deg F		**1,500**	**1,500**	**1,500**	**1,500**	**1,500**
Fly Ash Temperature	Deg F		441.0	414.8	419.7	416.8	**417.1**
Economizer Hopper Ash Temperature	Deg F		498.0	491.9	493.4	493.8	**493.0**
Air Heater Hopper Ash Temperature	Deg F		316.0	307.9	309.0	309.7	**308.9**
Ultimate Fuel Analysis							
Moisture	wt %	MpWF	**45.00**	37.62	37.27	37.83	**37.57**
Carbon	wt %	MpCF	**27.50**	30.39	30.67	30.84	**30.63**
Hydrogen	wt %	MpH2F	**3.37**	3.53	3.53	3.62	**3.56**
Nitrogen	wt %	MpN2F	**0.06**	0.24	0.23	0.23	**0.23**
Sulfur	wt %	MpSF	**0.01**	0.01	0.01	0.01	**0.01**
Ash	wt %	MpAsF	**0.71**	3.04	2.85	2.59	**2.83**
Oxygen	wt %	MpO2F	**23.39**	25.17	25.44	24.88	**25.16**
Chlorine	wt %		**0.00**	0.00	0.00	0.00	**0.00**
Sum of Components	wt %		**100.04**	**100.00**	**100.00**	**100.00**	**100.00**
Wet High Heating Value, HHV	GJ/Tonne	HHVF	**11.10**	12.05	12.13	12.01	**12.06**
Dry High Heating Value, HHV	GJ/Tonne		**20.18**	19.32	19.33	19.32	**19.32**
CaO in dry fuel ash	wt % ash	MpCaORs	**0.00**	0.000	0.000	0.000	**0.0**
Fly Ash Analysis							
Percent Fly Ash in Residue	%	MpRs55	**88.00**	**88.00**	**88.00**	**88.00**	**88.00**
Total Carbon	wt %	MpToCRs55	**15.00**	7.86	6.97	5.71	**6.84**
Organic Carbon Level	wt %		**15.00**	7.76	6.87	5.61	**6.74**
Unburned Carbon	wt %	MpCRs55	**15.00**	7.76	6.87	5.61	**6.74**

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Mineral Ash Analysis	wt %		**0.00**	0.00	0.00	0.00	**0.00**
CO2 in Fly Ash	wt %		**0.10**	**0.10**	**0.10**	**0.10**	**0.10**
Heating Value of Fly Ash	BTU/lb						
Economizer Hopper Ash Analysis							
Percent Economizer Ash in Residue		MpRs52	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**
Total Carbon	wt %	MpToCRs52	**0.00**	0.49	0.52	0.35	**0.45**
Organic Carbon Level	wt %		**0.00**	0.49	0.52	0.35	**0.45**
Unburned Carbon	wt %	MpCRs52	**0.00**	0.49	0.52	0.35	**0.45**
Mineral Ash Analysis	wt %		**0.00**	0.00	0.00	0.00	**0.00**
CO2 in Fly Ash	wt %		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Heating Value of Economizer Hopper Ash	BTU/lb						
Bottom Ash Analysis							
Percent Bottom Ash in Residue	%	MpRs37	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**
Total Carbon	wt %	MpToCRs37	**15.00**	0.23	0.19	0.14	**0.19**
Organic Carbon Level	wt %		**15.00**	0.13	0.09	0.04	**0.09**
Unburned Carbon	wt %	MpCRs37	**15.00**	0.13	0.09	0.04	**0.09**
Mineral Ash Analysis	wt %		**0.00**	0.00	0.00	0.00	**0.00**
CO2 in Bottom Ash	wt %		**0.10**	**0.10**	**0.10**	**0.10**	**0.10**
Heating Value of Bottom Ash	BTU/lb						
Air Heater Hopper Ash Analysis							
Percent Air Heater Hopper Ash in Residue	%		**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Unburned Carbon	%		**0.00**	0.49	0.52	0.35	**0.45**
CO2 in Air Heater Hopper Ash	%		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Urea Analysis							
% Composition	%		**0.00**	0.00	0.00	0.00	**0.00**
Aux Power							
Total Boiler Aux Load	kW		**5,300**	5,493	5,501	5,303	**5,432**
PA Fans	kW	KW5	**800**	1,018	1,021	1,038	**1,025**
SA Fans	kW	KW6	**800**	261	260	284	**268**
ID Fan	kW		**800**	2,753	2,746	2,740	**2,746**
Recirc Fan	kW		**800**	776	783	786	**782**
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	kW	ΣKWi	**0**	0	0	0	**0**
Overall Auxiliary Power Drive Efficiency	%		**90.00**	**90.00**	**90.00**	**90.00**	**90.00**
Misc Flow							
Aqueous ammonia to SCR (19% NH3)	lb/hr		**400**	163	162	162	**162**
Aqueous Ammonia Pressure	psia		**30.00**	**30.00**	**30.00**	**30.00**	**30.00**
Temperature of Aqueous Ammonia	Deg F		**80.0**	74.7	75.3	70.1	**73.4**
Primary Air Flow to NH3 Vaporizer	scfm		**500**	500	500	500	**500**
Flue Gas Recirc Flow Rate	lbm/hr		**204,100**	187,405	185,309	186,277	**186,330**
Limestone Flow Rate	lbm/h	MrSb	**28,409**	**28,409**	**28,409**	**28,409**	**28,409**
Sand Flow Rate	lbm/h	MrSb1	**0**	**0**	**0**	**0**	**0**
Sodium Bicarbonate Flow Rate	lbm/h		**120**	**120**	**120**	**120**	**120**
Ash Flow Basis - by Split or Measured Bottom Ash			**Assume**	**Assume**	**Assume**	**Assume**	
Bottom Ash Flow Rate	lbm/h	MrRs37	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**
Air Flow Rate Basis - Measure or Assume with Air Fraction			**Assume**	**Assume**	**Assume**	**Assume**	
Primary Air Flow Rate Air Fraction	%		25.96	33.81	33.97	34.06	**33.95**
Secondary Air Flow Rate Air Fraction	%		74.04	66.19	66.03	65.94	**66.05**
Primary Air Flow Rate	lbm/h	MrA11	**281,100**	284,643	287,139	285,389	**285,724**
Secondary Air Flow Rate	lbm/h		**801,600**	557,136	558,141	552,401	**555,893**
Urea Flow Rate	lbm/h		**0**	0	0	0	**0**
Atomizing Steam	lbm/h	MrSt46A	**0**	0	0	0	**0**
Sootblowing Steam	lbm/h	MrSt46	**0**	0	0	0	**0**

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PTC4 Input Summary

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE							
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	lbm/hr		**5,127**	0	0	0	**0**
Bottom Ash Cooling Water Flow Rate	gpm			135	140	140	**138**
Economizer Feedwater Inlet Pressure	psia		**1,875**	2,352	2,351	2,359	**2,354**
Economizer Feedwater Inlet Temperature	Deg F		**439.0**	439.2	439.3	439.0	**439.2**
Boiler Drum Pressure	psia		**1,799**	1,750	1,751	1,749	**1,750**
Boiler Continuous Blowdown Flash Tank Pressure	psia		**44.7**	44.4	44.5	44.1	**44.3**
Extraction to DA Temperature (SCAH Steam Inlet)	Deg F		**272.0**	274.4	274.6	274.0	**274.3**
Boiler HP Steam Outlet Pressure	psia		**1,634**	1,619	1,620	1,619	**1,619**
Boiler HP Steam Outlet Temperature	Deg F		**1,005.0**	998.4	998.7	998.8	**998.7**
Turbine Exhaust Pressure	psia		**1.180**	1.044	1.075	1.011	**1.043**
Bottom Ash Cooling Water Inlet Pressure	psia		**50.0**	62.9	62.8	62.9	**62.9**
Bottom Ash Cooling Water Inlet Temperature	Deg F		**86.0**	88.6	92.1	89.9	**90.2**
Bottom Ash Cooling Water Outlet Pressure	psia		**50.0**	62.9	62.8	62.9	**62.9**
Bottom Ash Cooling Water Outlet Temperature	Deg F		**101.0**	111.6	112.3	110.9	**111.6**
SCAH Steam Quality	%		**0.992**	**0.992**	**0.992**	**0.992**	**0.992**
Brine System Extraction Flow	lb/hr		**3,000**	**3,000**	**3,000**	**3,000**	**3,000**
Feedwater Flow Pipe Diameter	in		**10.126**	**10.126**	**10.126**	**10.126**	**10.126**
Feedwater Flow Throat Diameter	in		**6.240**	**6.240**	**6.240**	**6.240**	**6.240**
Feedwater Flow Differential Pressure Tap 1	inH2O		**68.9**	64.2	64.3	63.6	**64.0**
BFP Inlet Pressure	psia		**43.3**	76.4	76.6	76.1	**76.4**
BFP Inlet Temperature	Deg F		**272.0**	273.2	273.4	272.5	**273.0**
BFP Outlet Pressure	psia		**2,287**	2,418	2,417	2,424	**2,420**
BFP Outlet Temperature	Deg F		**276.0**	277.8	278.0	277.2	**277.7**
Feedwater Make-up Temperature	Deg F		**60.0**	75.5	75.6	75.4	**75.5**
First Extraction Pressure From Turbine	psia		**393.2**	385.3	385.7	383.7	**384.9**
Extraction Pressure Into HPFWH2	psia		**377.0**	371.3	371.6	369.9	**371.0**
FW Temperature Into HPFWH2	Deg F		**363.0**	371.9	371.8	371.5	**371.7**
Hotwell Temperature	Deg F		**107.0**	105.3	106.4	104.1	**105.3**
Hotwell Start Level	in		**48.0**	-4.4	-4.4	-3.8	**-4.2**
Hotwell End Level	in		**48.0**	-4.4	-3.8	-3.3	**-3.8**
Boiler Drum Start Level	in		**10.0**	-0.23	-0.13	-0.01	**-0.1**
Boiler Drum End Level	in		**10.0**	-0.18	0.08	-0.16	**-0.1**
DA Start Level	%		**50.0**	55.1	55.0	54.9	**55.0**
DA End Level	%		**50.0**	54.9	54.9	54.9	**54.9**
DI Start Level	ft		**27.0**	27.0	26.1	25.1	**26.1**
DI End Level	ft		**27.0**	26.1	25.1	24.1	**25.1**
Primary Air Inlet Temperature	Deg F		**80.0**	97.7	98.9	91.8	**91.8**
Primary Air Outlet Temperature	Deg F		**107.0**	108.4	107.5	106.4	**106.4**
Secondary Air Inlet Temperature	Deg F		**80.0**	66.3	68.5	60.9	**60.9**
Secondary Air Outlet Temperature	Deg F		**152.0**	155.1	154.9	155.0	**155.0**

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PTC4 Input Summary

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
PRIMARY VARIABLES FOR PTC46 Test Calculations							
Gross Power	kW		**114,820**	114,617	114,599	114,359	**114,525**
Plant Auxiliary Power	kW		**13,300**	11,740	11,697	11,415	**11,617**
Plant Net Power Output	kW		**101,520**	102,884	102,916	102,943	**102,915**
Plant Net Power Factor	-		**0.85**	0.994	0.994	0.994	**0.994**
Material Handling System Auxiliary Load	kW		**570**	485	492	254	**410**
Manual Auxiliary Loads	kW		**200**	200	200	202	**201**
INTERMEDIATE CALCULATIONS							
Water and Steam Flows							
Feedwater Flow Rate	lbm/hr		909,209	878,824	879,152	874,752	**877,576**
Boiler CBD Flow Rate	lbm/hr	mCBD	9,091	0	0	0	**0**
Drum Flow as a Result of Level Change	lbm/hr	mDRUM	**0**	10	37	-26	**7**
Steam Flow to Turbine	lbm/hr		900,118	878,834	879,189	874,726	**877,583**
Bottom Ash Cooling Water Mass Flow	lbm/hr			67,175	69,305	69,227	**68,569**
Boiler Output Energy (Steam Energy + Bottom Ash Cooling)	mmBTU/hr	QrO11	965.81	937.24	937.69	933.29	**936.07**
Corrected Boiler Output Energy	mmBTU/hr	Qr1corr	952.27	929.82	930.27	925.90	**928.67**
Fuel Input Energy	mmBTU/h		1,260.46	1,169.56	1,166.36	1,167.30	**1,167.74**
Boiler Efficiency	%		76.62	80.14	80.39	79.95	**80.16**
PTC4 Corrected Boiler Efficiency (Reference only)	%		80.16	77.68	77.67	77.66	**77.67**
HPFWH2 Extraction Pressure Drop	%		0.041	0.036	0.036	0.036	**0.036**
HPFWH2 TTD	Deg F		-0.14	-1.82	-1.83	-1.93	**-1.86**
Fuel Wet Higher Heating Value	Btu/lb	HHVF	4,768	5,178	5,212	5,161	**5,184**
Fuel Wet Higher Heating Value	Btu/lb	HHVF	8,670	8,302	8,306	8,302	**8,304**
Make-up Flow Rate	lbm/hr		5,940	6,243	6,990	7,163	**6,798**
SCAH Steam Flow Rate	lbm/hr		14,020	14,996	16,171	15,508	**15,558**
Total Extraction Flow (SCAH and Brine)	lbm/hr		17,020	17,996	19,171	18,508	**18,558**
Total Fuel Handling Auxiliary Load	kW		770	686	692	455	**611**
Bottom Ash Flow (Calculated)	lb/hr		1,529	1,789	1,760	1,729	**1,759**
Primary Air to NH3 Vaporizer	lb/hr		2,257	2,257	2,255	2,255	**2,255**

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
PRIMARY VARIABLES FOR CREDITS AND LOSSES CALCULATIONS							
Ambient Data							
Barometric Pressure	psia	Pa	**14.58**	**14.58**	**14.58**	**14.58**	**14.58**
Ambient Relative Humidity	%	Rhm	92%	92%	92%	92%	**92%**
Ambient Specific Humidity	lbm H2O/lbm	MFrDA	0.0205	0.0205	0.0205	0.0205	**0.0205**
Ambient Dry Bulb Temperature	Deg F	TA6d	**80.0**	**80.0**	**80.0**	**80.0**	**80.0**
Ambient Wet Bulb Temperature			**78.0**	**78.0**	**78.0**	**78.0**	**78.0**
Cooling Tower Wet Bulb Temperature			**78.0**	**78.0**	**78.0**	**78.0**	**78.0**
Enthalpy Reference Temperature	Deg F	TRe	**77.0**	**77.0**	**77.0**	**77.0**	**77.0**
Economizer							
Economizer Flue Gas O2	%	DvpO2 (14)	**2.88**	2.88	2.86	2.86	**2.87**
Economizer Flue Gas Exit Temperature	Deg F	T14	**498.0**	491.9	493.4	493.8	**492.6**
Air Heater Data							
Average FD Fan Outlet Temperature (SCAH Inlet)	Deg F	TA7		**71.6**	**73.2**	**70.8**	**72.4**
Average PA Fan Outlet Temperature (SCAH Inlet)	Deg F	TA7A		**103.1**	**103.6**	**101.7**	**103.3**
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	Deg F	TFgEn (14C)	**498.0**	491.9	493.4	493.8	**492.6**
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)			**452.0**	426.9	431.7	428.7	**429.3**
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)			**430.0**	402.7	407.7	405.0	**405.2**
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	Deg F	TFgLv (15)	**316.0**	**307.2**	**308.7**	**310.0**	**308.0**
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	Deg F	TA8C	**107.0**	**107.0**	**107.0**	**107.0**	**107.0**
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)			**379.7**	357.3	357.9	357.4	**357.6**
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)			**379.7**	357.3	357.9	357.4	**357.6**
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	Deg F	TA9A	**472.0**	441.5	442.6	442.3	**442.1**
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	Deg F	TA8B	**152.0**	**152.0**	**152.0**	**152.0**	**152.0**
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)			**372.4**	356.4	357.8	358.0	**357.1**
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)			**372.4**	356.4	357.8	358.0	**357.1**
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	Deg F	TA9	**447.0**	424.5	426.4	426.7	**425.4**
Average Flue Gas Recirculation Temperature			**366.0**	367.5	368.6	369.3	**368.0**
Primary Air Heater Flue Gas Compostion							
Dry Basis			**Dry Basis**	**Dry Basis**	**Dry Basis**	**Dry Basis**	
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	%	vpO2En (14(	**2.88**	2.88	2.86	2.86	**2.87**
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	%	DvPCO2	**16.50**	17.85	17.83	17.92	**17.84**
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	%	DvPO2Lv	**3.76**	3.95	3.91	3.91	**3.93**
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	%		**15.62**	15.86	16.34	16.00	**16.10**
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	ppm	DvpCO	**145.00**	29.69	26.67	25.10	**28.18**
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	ppm		**155.00**	155.00	155.00	155.00	**155.00**
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	ppm	DvPSO2	**138.00**	138.00	138.00	138.00	**138.00**
Ash and Fuel Temperatures							
Fuel Temperature	Deg F	T	**80.1**	80.1	80.1	80.1	**80.1**
Sorbent Temperature	Deg F	T1	**80.0**	74.7	75.3	70.1	**75.0**
Sand Temperature	Deg F	T2	**80.0**	74.7	75.3	70.1	**75.0**
Bottom Ash Temperature	Deg F		**1,500**	1,500	1,500	1,500	**1,500**
Fly Ash Temperature	Deg F			441.0	414.8	419.7	416.8	**417.3**
Economizer Hopper Ash Temperature	Deg F			498.0	491.9	493.4	493.8	**492.6**
Air Heater Hopper Ash Temperature	Deg F			316.0	307.9	309.0	309.7	**308.4**
Ultimate Fuel Analysis							
Moisture	wt %	MpWF	**45.00**	**45.00**	**45.00**	**45.00**	**45.00**
Carbon	wt %	MpCF	**27.50**	**27.50**	**27.50**	**27.50**	**27.50**
Hydrogen	wt %	MpH2F	**3.37**	**3.37**	**3.37**	**3.37**	**3.37**
Nitrogen	wt %	MpN2F	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**
Sulfur	wt %	MpSF	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
Ash	wt %	MpAsF	**0.71**	**0.71**	**0.71**	**0.71**	**0.71**
Oxygen	wt %	MpO2F	**23.39**	**23.39**	**23.39**	**23.39**	**23.39**
Chlorine	wt %		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Sum of Components	wt %		**100.04**	100.04	100.04	100.04	**100.04**
Wet High Heating Value, HHV	GJ/Tonne	HHVF	**11.10**	**11.10**	**11.10**	**11.10**	**11.10**
Dry High Heating Value, HHV	GJ/Tonne		**20.18**	**20.18**	**20.18**	**20.18**	**20.18**
CaO in dry fuel ash	wt % ash	MpCaORs	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Fly Ash Analysis							
Percent Fly Ash in Residue	%	MpRs55	**88.00**	88.00	88.00	88.00	**88.00**
Total Carbon	wt %	MpToCRs55	**15.00**	7.86	6.97	5.71	**7.41**
Organic Carbon Level	wt %		**15.00**	7.76	6.87	5.61	**7.31**
Unburned Carbon	wt %	MpCRs55	**15.00**	7.76	6.87	5.61	**7.31**

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
Mineral Ash Analysis	wt %		**0.00**	0.00	0.00	0.00	**0.00**
CO2 in Fly Ash	wt %		**0.10**	0.10	0.10	0.10	**0.10**
Heating Value of Fly Ash	BTU/lb						
Economizer Hopper Ash Analysis							
Percent Economizer Ash in Residue		MpRs52	**5.00**	5.00	5.00	5.00	**5.00**
Total Carbon	wt %	MpToCRs52	**0.00**	0.49	0.52	0.35	**0.51**
Organic Carbon Level	wt %		**0.00**	0.49	0.52	0.35	**0.51**
Unburned Carbon	wt %	MpCRs52	**0.00**	0.49	0.52	0.35	**0.51**
Mineral Ash Analysis	wt %		**0.00**	0.00	0.00	0.00	**0.00**
CO2 in Fly Ash	wt %		**0.00**	0.00	0.00	0.00	**0.00**
Heating Value of Economizer Hopper Ash	BTU/lb						
Bottom Ash Analysis							
Percent Bottom Ash in Residue	%	MpRs37	**5.00**	5.00	5.00	5.00	**5.00**
Total Carbon	wt %	MpToCRs37	**15.00**	0.23	0.19	0.14	**0.21**
Organic Carbon Level	wt %		**15.00**	0.13	0.09	0.04	**0.11**
Unburned Carbon	wt %	MpCRs37	**15.00**	0.13	0.09	0.04	**0.11**
Mineral Ash Analysis	wt %		**0.00**	0.00	0.00	0.00	**0.00**
CO2 in Bottom Ash	wt %		**0.10**	0.10	0.10	0.10	**0.10**
Heating Value of Bottom Ash	BTU/lb						
Air Heater Hopper Ash Analysis							
Percent Air Heater Hopper Ash in Residue	%		**2.00**	2.00	2.00	2.00	**2.00**
Unburned Carbon	%		**0.00**	0.49	0.52	0.35	**0.51**
CO2 in Air Heater Hopper Ash	%		**0.00**	0.00	0.00	0.00	**0.00**
Urea Analysis							
% Composition	%		**0.00**	0.00	0.00	0.00	**0.00**
Aux Power							
Total Boiler Aux Load	kW		**5,300**	5,493	5,501	5,303	**5,497**
PA Fans	kW	KW5	**800**	1,018	1,021	1,038	**1,019**
SA Fans	kW	KW6	**800**	261	260	284	**260**
ID Fan	kW		**800**	2,753	2,746	2,740	**2,749**
Recirc Fan	kW		**800**	776	783	786	**779**
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	kW	ΣKWi	**0**	0	0	0	**0**
Overall Auxiliary Power Drive Efficiency	%		**90.00**	90.00	90.00	90.00	**90.00**
Misc Flow							
Aqueous ammonia to SCR (19% NH3)	lb/hr		**400**	163	162	162	**162**
Aqueous Ammonia Pressure	psia		**30.00**	30.00	30.00	30.00	**30.00**
Temperature of Aqueous Ammonia	Deg F		**80.0**	74.7	75.3	70.1	**75.0**
Primary Air Flow to NH3 Vaporizer	scfm		**500**	500	500	500	**500**
Flue Gas Recirc Flow Rate	lbm/hr		**204,100**	187,405	185,309	186,277	**186,357**
Limestone Flow Rate	lbm/h	MrSb	**28,409**	28,409	28,409	28,409	**28,409**
Sand Flow Rate	lbm/h	MrSb1	**0**	0	0	0	**0**
Sodium Bicarbonate Flow Rate	lbm/h		**120**	120	120	120	**120**
Ash Flow Basis - by Split or Measured Bottom Ash			**Assume**	Assume	Assume	Assume	
Bottom Ash Flow Rate	lbm/h	MrRs37	**75,000**	75,000	75,000	75,000	**75,000**
Air Flow Rate Basis - Measure or Assume with Air Fraction			**Assume**	Assume	Assume	Assume	
Primary Air Flow Rate Air Fraction	%		25.96	33.81	33.97	34.06	**33.89**
Secondary Air Flow Rate Air Fraction	%		74.04	66.19	66.03	65.94	**66.11**
Primary Air Flow Rate	lbm/h	MrA11	**281,100**	284,643	287,139	285,389	**285,891**
Secondary Air Flow Rate	lbm/h		**801,600**	557,136	558,141	552,401	**557,639**
Urea Flow Rate	lbm/h		**0**	0	0	0	**0**
Atomizing Steam	lbm/h	MrSt46A	**0**	0	0	0	**0**
Sootblowing Steam	lbm/h	MrSt46	**0**	0	0	0	**0**

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PTC4 Input Summary

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE							
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	lbm/hr		**5,127**	0	0	0	**0**
Bottom Ash Cooling Water Flow Rate	gpm			135	140	140	**138**
Economizer Feedwater Inlet Pressure	psia		**1,875**	2,352	2,351	2,359	**2,352**
Economizer Feedwater Inlet Temperature	Deg F		**439.0**	439.2	439.3	439.0	**439.3**
Boiler Drum Pressure	psia		**1,799**	1,750	1,751	1,749	**1,750**
Boiler Continuous Blowdown Flash Tank Pressure	psia		**44.7**	44.4	44.5	44.1	**44.4**
Extraction to DA Temperature (SCAH Steam Inlet)	Deg F		**272.0**	274.4	274.6	274.0	**274.5**
Boiler HP Steam Outlet Pressure	psia		**1,634**	1,619	1,620	1,619	**1,619**
Boiler HP Steam Outlet Temperature	Deg F		**1,005.0**	998.4	998.7	998.8	**998.6**
Turbine Exhaust Pressure	psia		**1.180**	1.044	1.075	1.011	**1.060**
Bottom Ash Cooling Water Inlet Pressure	psia		**50.0**	62.9	62.8	62.9	**62.9**
Bottom Ash Cooling Water Inlet Temperature	Deg F		**86.0**	88.6	92.1	89.9	**90.4**
Bottom Ash Cooling Water Outlet Pressure	psia		**50.0**	62.9	62.8	62.9	**62.9**
Bottom Ash Cooling Water Outlet Temperature	Deg F		**101.0**	111.6	112.3	110.9	**112.0**
SCAH Steam Quality	%		**0.992**	0.99	0.99	0.99	**0.99**
Brine System Extraction Flow	lb/hr		**3,000**	3,000	3,000	3,000	**3,000**
Feedwater Flow Pipe Diameter	in		**10.126**	10.126	10.126	10.126	**10.126**
Feedwater Flow Throat Diameter	in		**6.240**	6.240	6.240	6.240	**6.240**
Feedwater Flow Differential Pressure Tap 1	inH2O		**68.9**	64.2	64.3	63.6	**64.3**
BFP Inlet Pressure	psia		**43.3**	76.4	76.6	76.1	**76.5**
BFP Inlet Temperature	Deg F		**272.0**	273.2	273.4	272.5	**273.3**
BFP Outlet Pressure	psia		**2,287**	2,418	2,417	2,424	**2,417**
BFP Outlet Temperature	Deg F		**276.0**	277.8	278.0	277.2	**277.9**
Feedwater Make-up Temperature	Deg F		**60.0**	75.5	75.6	75.4	**75.6**
First Extraction Pressure From Turbine	psia		**393.2**	385.3	385.7	383.7	**385.5**
Extraction Pressure Into HPFWH2	psia		**377.0**	371.3	371.6	369.9	**371.5**
FW Temperature Into HPFWH2	Deg F		**363.0**	371.9	371.8	371.5	**371.9**
Hotwell Temperature	Deg F		**107.0**	105.3	106.4	104.1	**105.9**
Hotwell Start Level	in		**48.0**	-4.4	-4.4	-3.8	**-4.4**
Hotwell End Level	in		**48.0**	-4.4	-3.8	-3.3	**-4.1**
Boiler Drum Start Level	in		**10.0**	-0.23	-0.13	-0.01	**-0.2**
Boiler Drum End Level	in		**10.0**	-0.18	0.08	-0.16	**0.0**
DA Start Level	%		**50.0**	55.1	55.0	54.9	**55.0**
DA End Level	%		**50.0**	54.9	54.9	54.9	**54.9**
DI Start Level	ft		**27.0**	27.0	26.1	25.1	**26.6**
DI End Level	ft		**27.0**	26.1	25.1	24.1	**25.6**
Primary Air Inlet Temperature	Deg F		**80.0**	97.7	98.9	91.8	**98.3**
Primary Air Outlet Temperature	Deg F		**107.0**	108.4	107.5	106.4	**107.9**
Secondary Air Inlet Temperature	Deg F		**80.0**	66.3	68.5	60.9	**67.4**
Secondary Air Outlet Temperature	Deg F		**152.0**	155.1	154.9	155.0	**155.0**

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PTC4 Input Summary

DATA SUMMARY

DESCRIPTION	UNITS	SYMBOL	DESIGN	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
PRIMARY VARIABLES FOR PTC46 Test Calculations							
Gross Power	kW		**114,820**	114,617	114,599	114,359	**114,608**
Plant Auxiliary Power	kW		**13,300**	11,740	11,697	11,415	**11,718**
Plant Net Power Output	kW		**101,520**	102,884	102,916	102,943	**102,900**
Plant Net Power Factor	-		**0.85**	0.994	0.994	0.994	**0.994**
Material Handling System Auxiliary Load	kW		**570**	485	492	254	**489**
Manual Auxiliary Loads	kW		**200**	200	200	202	**200**
INTERMEDIATE CALCULATIONS							
Water and Steam Flows							
Feedwater Flow Rate	lbm/hr		909,209	878,824	879,152	874,752	878,988
Boiler CBD Flow Rate	lbm/hr	mCBD	9,091	0	0	0	0
Drum Flow as a Result of Level Change	lbm/hr	mDRUM	**0**	10	37	-26	23
Steam Flow to Turbine	lbm/hr		900,118	878,834	879,189	874,726	879,012
Bottom Ash Cooling Water Mass Flow	lbm/hr			67,175	69,305	69,227	68,240
Boiler Output Energy (Steam Energy + Bottom Ash Cooling)	mmBTU/hr	QrO11	965.81	937.24	937.69	933.29	937.47
Corrected Boiler Output Energy	mmBTU/hr	Qr1corr	952.27	929.82	930.27	925.90	930.05
Fuel Input Energy	mmBTU/h		1,260.46	1,206.47	1,207.26	1,201.76	1,206.86
Boiler Efficiency	%		76.62	80.14	80.39	79.95	80.27
PTC4 Corrected Boiler Efficiency (Reference only)	%		80.16	77.68	77.67	77.66	77.68
HPFWH2 Extraction Pressure Drop	%		0.041	0.036	0.036	0.036	0.036
HPFWH2 TTD	Deg F		-0.14	-1.82	-1.83	-1.93	-1.83
Fuel Wet Higher Heating Value	Btu/lb	HHVF	4,768	4,768	4,768	4,768	4,768
Fuel Wet Higher Heating Value	Btu/lb	HHVF	8,670	8,670	8,670	8,670	8,670
Make-up Flow Rate	lbm/hr		5,940	6,243	6,990	7,163	6,616
SCAH Steam Flow Rate	lbm/hr		14,020	14,996	16,171	15,508	15,583
Total Extraction Flow (SCAH and Brine)	lbm/hr		17,020	17,996	19,171	18,508	18,583
Total Fuel Handling Auxiliary Load	kW		770	686	692	455	689
Bottom Ash Flow (Calculated)	lb/hr		1,529	1,688	1,703	1,677	1,695
Primary Air to NH3 Vaporizer	lb/hr		2,257	2,257	2,255	2,255	2,256

4.0 Calculations

Calculations for the Corrected Plant Electrical Output, Corrected Plant Cycle Heat Rate, and Boiler Guarantees are presented in this section. The general equations for each parameter are provided below.

Calculations are performed in the following order:

- The raw test data was summarized and averaged. Raw data is provided in Appendix A.1 for each of the three (3), four (4) hour, performance test runs.
- The summarized data for input into the Calculation Model was compiled into the data summary table given in Section 3.0 of this Report.
- The Calculation Model takes the inputs from the Data Summary and calculates the Corrected Plant Electrical Output, Corrected Plant Cycle Heat Rate, and Boiler Guarantees for each of the test runs. Printouts of these calculations are provided in Section 4.0 of this report.

Supporting calculations such as feedwater flows and SCAH flows are provided in Appendix C. The primary calculation parameters are presented below. The calculated correction factors from the Output and Heat Rate testing are included at the end of Section 4.0.

4.1 Correction Factors

4.1.1 The measured Plant Net Electrical Output and Plant Cycle Net Heat Rate were corrected back to the Base Performance Conditions using corrections to the power output, and heat rate per section 1.31 of Appendix VIII of the contract with the exception of utilizing PTC4 correction methodology to correct the boiler performance as described in section 2.2.4.2. A listing of the additive and multiplicative correction for Plant Net Electrical Output and Plant Cycle Net Heat Rate are provided in Table 4-1 and Table 4-2 and respectively. For consistency with the design of the plant net guarantees, heat rate shall be based upon the calculated fuel flow as determined from the boiler output steam energy and boiler efficiency determined by the PTC 4 2008 Energy Balance method.

Table 4-1: Plant Net Output and Heat Input Additive Correction Factors

Power Corr.	Heat Rate Corr.	Correction	Corr. Applied To Net Output	Corr. Applied To Heat Rate
Δ_1	ω_1	Thermal Efflux from Process Steam Flow and Enthalpy	No*[1]	Yes*[3]
Δ_2	ω_2	Generator Power Factor	Yes	Yes
Δ_3	ω_3	Steam Generator Blowdown	No*[1]	Yes
Δ_4	ω_4	Secondary Heat Inputs from Process return or make-up	No[1]	Yes
Δ_5	ω_5	Ambient Conditions at Cooling Tower Air Inlet	Yes	No
Δ_6	ω_6	Auxiliary Loads, Thermal and Electrical	Yes*[2]	Yes*[2]
Δ_7	ω_7	Operating disposition different than required (Steam Flow)	No	No

1. For additive correction factors, corrections not applied shall be equal to 0.
2. Material Handling System Auxiliary Load will be corrected to 770 kW.
3. Steam to air preheater at 14,200 pounds per hour is included in guarantee basis.

Table 4-2: Plant Net Output and Heat Input Multiplicative Correction Factors

Corr. to Thermal Heat Input	Power Corr.	Heat Rate Corr. *4	Correction	Corr. Applied To Net Output	Corr. Applied To Heat Rate
β_1*[2]	α_1	f_1	Inlet Temperature Correction	Yes	Yes
β_2*[2]	α_2	f_2	Ambient Pressure Correction	Yes	Yes
β_3*[2]	α_3	f_3	Ambient Humidity Correction	Yes	Yes
β_4*[2]	α_4	f_4	Fuel Supply Temperature	No[1]	No[1]
β_5*[2]	α_5	f_5	Fuel Higher Heating Value	No[1]	Yes
β_6*[2]	α_6	f_6	Fuel Ash Content	No[1]	Yes
β_7*[2]	α_7	f_7	Fuel Moisture Content	No[1]	Yes
β_8*[2]	α_8	f_8	Feedwater Temperature	No[1]	No[1]

1. For additive correction factors, corrections not applied shall be equal to 0; for multiplicative corrections, corrections not applied shall be equal to 1.
2. This factor is dependent upon boiler vendor supplied correction curves; some may not apply if they are negligible.
3. These corrections are applied in PTC 4 model in the calculation of efficiency.
4. Heat Correction f is essentially β/α.

4.2 Plant Net Output and Heat Rate

4.2.1 Boiler Efficiency

For the purpose of calculating Plant Heat Rate, Boiler Efficiency was determined by ASME PTC energy Balance method ASME PTC 4 2008.

The boiler efficiency, η_B will be calculated using the following formula

$$\eta_B = \left[1 - \frac{(losses - credits)}{energy\ input}\right] \times 100$$

4.2.1.1 As tested boiler efficiency (η_{Meas}) was calculated by entering in the test measured parameters associated with the boiler boundary into a PTC4 2008 model.

- Ambient Temperature
- Barometric Pressure
- Relative Humidity
- Fuel Higher Heating Value
- Fuel Composition (Ultimate Analysis, Fuel Ash, and Fuel Moisture)
- Sorbent Composition
- Ash Composition (Bed and Fly)
- Flue Gas Composition
- Flue Gas Temperature
- Feedwater Flow
- Feedwater Pressure
- Feedwater Temperature
- Desuperheating Spray Flow
- Desuperheating Spray Temperature
- Desuperheating Spray Pressure
- Main Steam Pressure
- Main Steam Temperature
- Blowdown Steam Flow (isolated for the test)
- Air Temperature after the SCAH Coils
- Miscellaneous secondary parameters

Corrected boiler efficiency (η_{Corr46}) was corrected for the following. The contract Section 1.3.1 Appendix VIII calls out that the boiler manufacturer will supply correction curves curves, however, as described in Section 2.2.4.2, PTC4 correction methodology was used in the determination of the corrected boiler efficiency and heat input.

- Ambient Wet Bulb Temperature
- Ambient Dry Bulb Temperature
- Barometric Pressure
- Fuel HHV
- Fuel Ash Content
- Fuel Moisture Content

4.2.1.2 The following Losses and Credits from ASME PTC 4-2008 were used for the Energy Balance method. The guarantee approach utilizes units standardized to a Btu/lb fuel input basis while the PTC uses a mixed approach of Btu/lb of fuel and % overall fuel input.

Table 4-3: Table of Parameters for Energy Balance Method

Parameter	Units	PTC-4 2008
Losses [*1]		
Dry Gas - PA AH 2 Outlet	%	QpLDfg2
Wet Air to Ammonia Vaporizer and Hydrous Ammonia	%	QpLDfg
Dry Gas - PA AH 1 Outlet	%	QpLDfg1
Water from H2 Fuel	%	QpLH2F
Water from H2O Fuel	%	QpLWF
Moisture in Air	%	QpLWA
Additional Moisture from Flue Gas Recirculation	%	QpLWR
Bottom Ash Cooling Water	%	QpLBAC
Unburned Carbon in Residue	%	QpLUbC
Sensible Heat of Refuse	%	QpLRs
Surface Radiation and Convection	%	QpLSrc
Water in Sorbent	Btu/hr	QrLWSb
Dry Gas from FGR	Btu/hr	QrLFGR
Credits [*1]		
Entering Dry Gas - PA AH 1 Inlet	%	QpBDfg
Steam Coil Air Heater	%	QpBSCAH
Moisture due to Hydrous Ammonia	%	QpBA
Entering Dry Air	%	QpBDA
Moisture in Air	%	QpBWA
Sensible Heat in Fuel	%	QpBF
Auxiliary Equipment Power	%	QpBX
Flue Gas Recirculation Entering Wet Gas	%	QpBWfgR
Sensible Heat for Sorbent	Btu/hr	QrBSb
Energy Input		
Higher Heating Value of Fuel	Btu/lb of fuel	QrF

1. Some of these credits and losses may not be calculated based on their minimal impact to uncertainty. Some credits not applicable to Biomass fueled boilers were excluded.

4.2.2 Measured Net Heat Rate

$$NPHR = \left(\frac{W_f*(h_t-h_f)+W_{BD}*(h_{BD}-h_{fwd})}{\eta_{BLR}*kW_{net}}\right)$$

Where:

NPHR =*Net Plant Heat Rate Measured*
Wt =*Main Steam Flow*
h_t =*Main Steam Enthalpy*
W_f =*Feedwater Flow*
h_f =*Final Feedwater Enthalpy*
W_{bd} =*Boiler Blowdown Flow set at zero for test*
h_{bd} =*Boiler Blowdown Enthalpy*
η_{BLR} =*Boiler Efficiency calculated with PTC 4*
kW_{net} =*Net power measured*

4.2.3 Corrected Net Electrical Output and Net Heat Rate

The measured Net Electrical Power was corrected to the Guarantee Ambient Conditions

The measured heat rate was corrected to the Guaranteed Ambient Conditions listed in 1.1 of Section VI of the contract and are reproduced in Table 3-1using the additive and multiplicative correction factors listed in Table 5.1 and 5.2 of PTC 46 and reproduced in Table 5-1 and 5-2.

$$NPHR_{corr} = \left[\left[\frac{\left[W_f * \left(h_t - h_f\right)\right] + W_{BD} * \left(h_{bd} - h_{fw}\right)\right] * \prod_{i=1}^{8}\beta_i + \left[\sum_{i=0}^{8}\omega_i\right]}{\eta_{BLR} * \left[\left(kW_{net} * \prod_{i=1}^{8}\alpha_i\right) + \sum_{i=1}^{8}\Delta_i\right]}\right]\right]$$

Where

Δ_i = *Power Additive corrections factors from table 5.1*
ω_i = *Heat Rate Additive correction factors from table 5.1*
α_i = *Power multiplicative factors from table 5.2*
β_i = *Heat Rate multiplicative factors from table 5.2*

4.3 Boiler Calculation Methodology

4.3.1 Main Steam Mass Flow

The mass flow of the main steam at the HP boiler outlet was calculated as the sum of the final feedwater flow minus blowdown minus drum sample flow. The drum sample flow was assumed isolated for the duration of the tests.

$$W_t = W_f - Wbd - Wds$$

Where:

Wt =*Mass flow of main steam at HP boiler outlet, lbm/hr*
Wf =*Final feedwater mass flow*
Wds =*Mass flow of boiler drum sample line, lbm/hr closed for test*
Wbd =*Mass flow of boiler blow down line, lbm/hr- set at 1% of boiler output*

4.3.2 Fuel Heat Input

Fuel Heat Input was determined as the boiler steam output divided by boiler efficiency.

$$QrI = Qo/EF'$$

Where:

QrI	=	*Boiler fuel heat input, mmBtu/hr*
Qo	=	*Boiler steam output, mmBtu/hr*
EF'	=	*Calculated boiler efficiency, %*

4.3.2.1 Corrected boiler efficiency (η_{Corr4}) and fuel heat input was corrected for the following. The contract Section 1.3.1 Appendix VIII calls out that the boiler manufacturer will supply correction curves, however, as described in Section 2.2.4.2, PTC4 correction methodology was used in the determination of the corrected boiler efficiency and heat input.

- Ambient Wet Bulb Temperature
- Ambient Dry Bulb Temperature
- Barometric Pressure
- Fuel HHV
- Fuel Ash Content
- Fuel Moisture Content
- Feedwater Temperature
- Blowdown

4.3.3 Auxiliary Power Consumption

Auxiliary Power Consumption is the sum of the consumptions listed in Table 3-1, and is corrected for the following.

- Fuel HHV
- Boiler Load

4.3.4 Steam Temperature at Superheater Outlet

Superheater outlet temperature was measured as close to the boiler terminal point as practical by a calibrated thermal sensing device.

4.3.5 In order to correct the isolation of the boiler blowdown, the boiler feedwater flow and the boiler efficiency were assumed to be constant. In this way, when the blowdown is increased to 1%, the boiler will produce less steam output, and will consume slightly less fuel input. This allows for the correction of the boiler performance for the 1% blowdown and corrects the results to an operating condition at which the test validates the unit can operate.

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
LOSSES, %							
Dry Gas - PA AH 2 Outlet	%	*QpLDfg*	7.780	7.292	7.394	7.536	**7.407**
Wet Air to Ammonia Vaporizer and Hydrous Ammonia	%	*QpLDfg*	0.046	0.026	0.026	0.025	**0.025**
Dry Gas - PA AH 1 Outlet	%	*QpLDfg*	5.159	5.066	5.083	5.242	**5.130**
Water from H2 Fuel	%	*QpLH2F*	7.305	7.033	6.989	7.241	**7.088**
Water from H2O Fuel	%	*QpLWF*	10.928	8.386	8.257	8.467	**8.370**
Moisture in Air	%	*QpLWA*	0.179	0.124	0.133	0.118	**0.125**
Additional Moisture from Flue Gas Recirculation	%		3.603	3.021	2.986	2.962	**2.989**
Bottom Ash Cooling Water	%		0.000	0.132	0.120	0.124	**0.125**
Unburned Carbon in Residue	%	*QpLUbC*	0.350	0.628	0.513	0.380	**0.507**
Sensible Heat of Refuse	%	*QpLRs*	0.016	0.055	0.051	0.046	**0.050**
Surface Radiation and Convection	%	*QpLSrc*	**0.200**	**0.200**	**0.200**	**0.200**	**0.200**
Other Losses	%	-	**1.000**	0.000	0.000	0.000	**0.000**
Summation of Losses	%	*Σ QpL*	36.566	31.960	31.752	32.340	**32.017**
LOSSES, mmBTU/hr							
Surface Radiation and Convection	mmBTU/h	*QrLSrc*	0.000	0.000	0.000	0.000	**0.000**
Sorbent Calcination / Dehydration	mmBTU/h	*QrLClh*	0.000	0.000	0.000	0.000	**0.000**
Dry Flue gas Recirculation Loss (Uncombusted)	mmBTU/h		9.507	8.717	8.665	8.759	**8.713**
Water from Sorbent	mmBTU/h	*QrLWSb*	0.000	0.000	0.000	0.000	**0.000**
Other Losses	mmBTU/h		0.000	0.000	0.000	0.000	**0.000**
Summation of Losses	mmBTU/h	*Σ QrL*	9.507	8.717	8.665	8.759	**8.713**
CREDITS, %							
Entering Dry Gas - PA AH 1 Inlet	%		7.682	7.195	7.297	7.439	**7.310**
Steam Coil Air Heater	%		0.000	0.000	0.000	0.000	**0.000**
Hydrous Ammonia	%		0.041	0.019	0.019	0.019	**0.019**
Entering Dry Air	%	*QpBDA*	1.229	1.213	1.203	1.234	**1.217**
Moisture in Air	%	*QpBWA*	0.047	0.033	0.035	0.031	**0.033**
Sensible Heat in Fuel	%	*QpBF*	0.226	0.209	0.207	0.209	**0.208**
Auxiliary Equipment Power	%	*QpBX*	0.000	0.000	0.000	0.000	**0.000**
Flue Gas Recirculation Entering Wet Gas	%		4.718	4.172	4.127	4.111	**4.137**
Summation of Credits	%	*Σ QpB*	13.944	12.841	12.889	13.043	**12.924**
CREDITS, mmBTU/hr							
Auxiliary Equipment Power	mmBTU/h	*QrBX*	0.000	0.000	0.000	0.000	**0.000**
Sensible Heat from Sorbent	mmBTU/h	*QrBSb*	0.000	0.000	0.000	0.000	**0.000**
NaHCO3 Credit	mmBTU/h	-	0.003	0.003	0.003	0.003	**0.003**
Summation of Credits	mmBTU/h	*Σ QrB*	0.003	0.003	0.003	0.003	**0.003**
MEASURED RESULTS							
Boiler Efficiency	%	*EF'*	76.624	80.136	80.395	79.953	**80.161**
Input from Fuel	mmBTU/h	*Qrl*	1,260.464	1,169.563	1,166.363	1,167.299	**1,167.741**
Fuel Rate	Klbm/hr	*MrF*	264.337	225.867	223.764	226.181	**225.271**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
LOSSES, %						
Dry Gas - PA AH 2 Outlet	%	*QpLDfg*	7.256	7.351	7.289	**7.299**
Wet Air to Ammonia Vaporizer and Hydrous Ammonia	%	*QpLDfg*	0.018	0.018	0.018	**0.018**
Dry Gas - PA AH 1 Outlet	%	*QpLDfg*	5.028	5.049	5.078	**5.052**
Water from H2 Fuel	%	*QpLH2F*	7.279	7.282	7.285	**7.282**
Water from H2O Fuel	%	*QpLWF*	10.888	10.894	10.898	**10.893**
Moisture in Air	%	*QpLWA*	0.189	0.190	0.190	**0.190**
Additional Moisture from Flue Gas Recirculation	%		3.369	3.332	3.364	**3.355**
Bottom Ash Cooling Water	%		0.128	0.116	0.121	**0.121**
Unburned Carbon in Residue	%	*QpLUbC*	0.159	0.140	0.113	**0.137**
Sensible Heat of Refuse	%	*QpLRs*	0.014	0.014	0.014	**0.014**
Surface Radiation and Convection	%	*QpLSrc*	**0.200**	**0.200**	**0.200**	**0.200**
Other Losses	%	-	0.000	0.000	0.000	**0.000**
Summation of Losses	%	*Σ QpL*	34.527	34.585	34.569	**34.561**
LOSSES, mmBTU/hr						
Surface Radiation and Convection	mmBTU/h	*QrLSrc*	0.000	0.000	0.000	**0.000**
Sorbent Calcination / Dehydration	mmBTU/h	*QrLClh*	0.000	0.000	0.000	**0.000**
Dry Flue gas Recirculation Loss (Uncombusted)	mmBTU/h		8.446	8.405	8.498	**8.450**
Water from Sorbent	mmBTU/h	*QrLWSb*	0.000	0.000	0.000	**0.000**
Other Losses	mmBTU/h		0.000	0.000	0.000	**0.000**
Summation of Losses	mmBTU/h	*Σ QrL*	8.446	8.405	8.498	**8.450**
CREDITS, %						
Entering Dry Gas - PA AH 1 Inlet	%		7.162	7.256	7.198	**7.205**
Steam Coil Air Heater	%		0.000	0.000	0.000	**0.000**
Hydrous Ammonia	%		0.017	0.016	0.017	**0.017**
Entering Dry Air	%	*QpBDA*	1.162	1.160	1.159	**1.160**
Moisture in Air	%	*QpBWA*	0.049	0.048	0.048	**0.049**
Sensible Heat in Fuel	%	*QpBF*	0.039	0.039	0.039	**0.039**
Auxiliary Equipment Power	%	*QpBX*	0.000	0.000	0.000	**0.000**
Flue Gas Recirculation Entering Wet Gas	%		4.483	4.433	4.476	**4.464**
Summation of Credits	%	*Σ QpB*	12.911	12.953	12.936	**12.933**
CREDITS, mmBTU/hr						
Auxiliary Equipment Power	mmBTU/h	*QrBX*	0.000	0.000	0.000	**0.000**
Sensible Heat from Sorbent	mmBTU/h	*QrBSb*	0.000	0.000	0.000	**0.000**
NaHCO3 Credit	mmBTU/h	-	0.003	0.003	0.003	**0.003**
Summation of Credits	mmBTU/h	*Σ QrB*	0.003	0.003	0.003	**0.003**
MEASURED RESULTS						
Boiler Efficiency	%	*EF'*	77.684	77.671	77.660	**77.672**
Input from Fuel	mmBTU/h	*Qrl*	1,206.472	1,207.257	1,201.758	**1,205.162**
Fuel Rate	Klbm/hr	*MrF*	253.014	253.179	252.025	**252.739**

Manufacturer's Correction Methodology

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Manufacturer Boiler Corrections							
Correction Curve Inputs							
Correction Input C1: HHV (dry)	BTU/lbm		8,670	8,301	8,309	8,301	**8,304**
Correction Input : HHV (as fired)	BTU/lbm		4,768	5,178	5,212	5,161	**5,184**
Correction Input : LHV (as fired)	BTU/lbm		4,658	5,086	5,121	5,069	**5,092**
Correction Input C2: Fuel Ash Content	wt % Dry		1.29	4.87	4.54	4.17	**4.53**
Correction Input C3&C8: Fuel Moisture Content	wt %		45.00	37.62	37.27	37.83	**37.57**
Correction Input C4: Avg Air Temp at Flue Gas Air Preheater Inlet	Deg F		140.32	139.29	138.83	138.43	**138.85**
Correction Input C5: Feed Water Temperature at Economizer Inlet	Deg F		439.00	439.24	439.31	438.97	**439.17**
Correction Input C6: Fuel Temperature	Deg F		80.06	95.00	95.00	95.00	**95.00**
Correction Input C7: Air humidity	lbm H2O/lbm Dry air		0.021	0.015	0.016	0.013	**0.015**
Correction Input C9: Boiler load % MCR	%		99.36	96.42	96.47	96.02	**96.30**
Correction Input C3&C8: Fuel Moisture Content	wt %		45.00	37.62	37.27	37.83	**37.57**
Total Boiler Auxiliary Load	kW		5,300	5,493	5,501	5,303	**5,432**
Correction factor C8: Fuel HHV (as fired)			1.00000	0.92025	0.91588	0.92288	**0.91967**
Correction factor C9: Boiler Load % MCR			0.99164	1.00665	1.00645	1.00836	**1.00715**
Corrected Total Boiler Auxiliary Load	kW		**5,256**	**5,089**	**5,071**	**4,935**	**5,031**

PTC46 Plant Calculations

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Gross Power	kW		114,820	114,617	114,599	114,359	**114,525**
Plant Auxiliary Power	kW		13,300	11,740	11,697	11,415	**11,617**
Plant Net Power Output	kW		101,520	102,884	102,916	102,943	**102,915**
Plant Net Power Factor	-		0.85	0.99	0.99	0.99	**0.99**
Material Handling System Auxiliary Load	kW		770	686	692	455	**611**
Boiler Output Energy (Steam Energy + Bottom Ash Cooling)	mmBTU/hr		965.81	937.24	937.69	933.29	**936.07**
Fuel Input Energy (HHV)	mmBTU/hr		1,260.46	1,169.56	1,166.36	1,167.30	**1,167.74**
Corrected Boiler Fuel Input - PTC46 Boundary (HHV)	mmBTU/hr		1,260.46	1,173.70	1,173.46	1,172.76	**1,173.31**
Boiler Efficiency	%		76.62	80.14	80.39	79.95	**80.16**
PTC4 Corrected Boiler Efficiency	%		80.16	77.68	77.67	77.66	**77.67**
Continuous Blowdown Flow Rate (to Blowdown Flash Tank)	lb/hr		9,091	0	0	0	**0**
Cooling Tower Wet Bulb	Deg F	Tctwb	78.00	68.39	69.89	65.17	**67.81**
Inlet Air Wet Bulb Temperature	Deg F	Twb	78.00	69.93	71.49	66.88	**69.43**
Cooling Tower Wet Bulb Depression	Deg F	Tctwb - Twb	0.00	-1.55	-1.60	-1.71	**-1.62**
Inlet Air Temperature	Deg F	Tamb	80.00	74.66	75.32	70.07	**73.35**
Ambient Pressure	Psia	Pamb	14.58	14.74	14.73	14.74	**14.74**
Ambient Relative Humidity	%	RHamb	91.60	79.40	83.28	85.03	**82.57**
Fuel Higher Heating Value (HHV dry_	BTU/lbm	HHV	8,669.82	8,302.14	8,306.44	8,302.14	**8,303.57**
Fuel Ash Content	wt% Dry	MpAsD	1.29	4.87	4.54	4.17	**4.53**
Fuel Moisture	wt%	MpWF	45.00	37.62	37.27	37.83	**37.57**
Fuel Temperature	Deg F	TF	80.06	95.00	95.00	95.00	**95.00**
Measured Net Power Output	kW	Pmeas	**101,520**	**102,884**	**102,916**	**102,943**	**102,915**
Additive Corrections to Power Output							
Material Handling System Auxiliary Load Correction	kW	Δ_1	0.0	-84.2	-78.4	-314.8	**-159.1**
Blowdown Correction	kW	Δ_3	-0.1	-874.9	-874.9	-874.9	**-874.9**
Cooling Tower Wet Bulb Change	kW	Δ_{5A}	0.0	-124.2	-128.3	-137.0	**-129.8**
Multiplicative Corrections to Power Output							
Inlet Air Temperature Correction	-	α_1	1.00000	0.99677	0.99711	0.99482	**0.99623**
Ambient Pressure Correction	-	α_2	1.00000	1.00000	1.00000	1.00000	**1.00000**
Ambient Relative Humidity Correction, T = 60	-	$\alpha_{3,60}$	*1.00000*	*0.99998*	*0.99996*	*0.99996*	***0.99997***
Ambient Relative Humidity Correction, T = 70	-	$\alpha_{3,70}$	*1.00000*	*0.99919*	*0.99941*	*0.99953*	***0.99938***
Ambient Relative Humidity Correction, T = 80	-	$\alpha_{3,80}$	*1.00000*	*0.99785*	*0.99851*	*0.99881*	***0.99839***
Ambient Relative Humidity Correction, T = 90	-	$\alpha_{3,90}$	*1.00000*	*0.99618*	*0.99735*	*0.99790*	***0.99715***
Ambient Relative Humidity Correction, T = 100	-	$\alpha_{3,100}$	*1.00000*	*0.99432*	*0.99609*	*0.99690*	***0.99577***
Ambient Relative Humidity Correction, T = Tamb	-	α_3	1.00000	0.99857	0.99893	0.99952	**0.99901**
Fuel Temperature Correction	-	α_4	1.00000	1.00000	1.00000	1.00000	**1.00000**
Fuel Higher Heating Value (Dry) Correction	-	α_5	1.00000	0.99997	0.99997	0.99997	**0.99997**
Fuel Moisture Correction	-	α_6	1.00000	1.00006	1.00006	1.00006	**1.00006**
Sum of Additive Corrections to Power Output	kW	Δ	-0.1	-1083.3	-1081.6	-1326.7	**-1163.9**
Product of Multiplicative Corrections to Power Output	-	α	1.00000	0.99537	0.99608	0.99437	**0.99527**
Corrected Net Power Output	kW	Pcor	**101,520**	**101,325**	**101,431**	**101,037**	**101,264**
Guarantee Net Power Output	kW		**101,520**	**101,520**	**101,520**	**101,520**	**101,520**
Margin	%			-0.19%	-0.09%	-0.48%	**-0.25%**
Measured Fuel Heat Input (HHV)	mmBTU/h	HImeas	1,260.46	1,169.56	1,166.36	1,167.30	**1,167.74**
Measured Net Heat Rate (HHV)	BTU/kWh	HRmeas	12,415.92	11,367.73	11,333.16	11,339.25	**11,346.71**
Multiplicative Corrections to Heat Input							
Inlet Air Temperature Correction	-	β_1	1.00000	1.00030	1.00026	1.00051	**1.00036**
Ambient Pressure Correction	-	β_2	1.00000	1.00002	1.00002	1.00002	**1.00002**
Ambient Relative Humidity Correction, T = 60	-	$\beta_{3,60}$	*1.00000*	*1.00012*	*1.00008*	*1.00006*	***1.00009***
Ambient Relative Humidity Correction, T = 70	-	$\beta_{3,70}$	*1.00000*	*1.00017*	*1.00012*	*1.00009*	***1.00013***
Ambient Relative Humidity Correction, T = 80	-	$\beta_{3,80}$	*1.00000*	*1.00025*	*1.00017*	*1.00013*	***1.00018***
Ambient Relative Humidity Correction, T = 90	-	$\beta_{3,90}$	*1.00000*	*1.00036*	*1.00025*	*1.00020*	***1.00027***
Ambient Relative Humidity Correction, T = 100	-	$\beta_{3,100}$	*1.00000*	*1.00051*	*1.00035*	*1.00028*	***1.00038***
Ambient Relative Humidity Correction, T = Tamb	-	β_3	1.00000	1.00021	1.00015	1.00009	**1.00015**
Boiler Output Energy (Steam Energy + Bottom Ash Cooling)	mmBTU/hr		965.81	937.24	937.69	933.29	**936.07**
PTC4 Corrected Boiler Efficiency	%		76.62	77.68	77.67	77.66	**77.67**
Product of Cycle Corrections	-		1.0000	1.0005	1.0004	1.0006	**1.0005**
Measured Net Power + Delta Corrections	kW		101,520	101,801	101,834	101,617	101,751
Corrected Heat Rate by PTC4 Methodology	**BTU/kWh**		**12,415.93**	**11,857.51**	**11,860.19**	**11,833.84**	**11,850.51**
Guarantee Heat Rate	**BTU/kWh**		**12,559.00**	**12,559.00**	**12,559.00**	**12,559.00**	**12,559.00**
Margin	%			-5.59%	-5.56%	-5.77%	**-5.64%**

5.0 Results and Conclusions

5.1 Plant Performance Test Results

Results of the Plant Performance Tests completed per the testing schedule in Table 2-1, are provided in Table 5-1 below.

Table 5-1: Plant Performance Test Results

Description	Units	Test Run 1	Test Run 2	Test Run 3	Average
Plant Electrical Output					
Guaranteed Plant Electrical Output	kW	101,520	101,520	101,520	101,520
Measured Plant Electrical Output	kW	102,884	102,916	102,943	102,915
Corrected Plant Electrical Output	**kW**	**101,325**	**101,431**	**101,037**	**101,264**
Margin from Guarantee	kW	-195	-89	-483	-256
	%	-0.19	-0.09	-0.48	-0.25
Plant Cycle Heat Rate					
Guaranteed Plant Cycle Heat Rate	Btu/kWh	12,559	12,559	12,559	12,559
Measured Plant Cycle Heat Rate	Btu/kWh	11,368	11,333	11,339	11,347
Corrected Plant Cycle Heat Rate	**Btu/kWh**	**11,857**	**11,860**	**11,834**	**11,850**
Margin from Guarantee	Btu/kWh	-702	-699	-725	-709
	%	-5.59	-5.56	-5.77	-5.64

5.2 Boiler Performance Test Results

Results of the Boiler Performance Tests completed per the testing schedule in Table 2-1, are provided in Table 5-2 below.

Table 5-2: Boiler Performance Test Results

Description	Units	Test Run 1	Test Run 2	Test Run 3	Average
Boiler Steam Output					
Guaranteed Boiler Steam Output	lb/hr	907,640	907,640	907,640	907,640
Measured Plant Steam Flow	lb/hr	878,834	879,189	874,726	877,583
Corrected Plant Steam Flow	**lb/hr**	**870,045**	**870,397**	**865,979**	**868,807**
Margin from Guarantee	lb/hr	-37,594	-37,243	-41,661	-38,833
	%	-4.14	-4.10	-4.59	-4.28
Fuel Heat Input					
Guaranteed Fuel Heat Input	mmBtu/hr	1,275	1,275	1,275	1,275
Measured Fuel Heat Input	mmBtu/hr	1,170	1,166	1,167	1,167
Corrected Fuel Heat Input	**mmBtu/hr**	**1,206**	**1,207**	**1,202**	**1,205**
Margin from Guarantee	mmBtu/hr	-69	-68	-73	-70
	%	-5.37	-5.31	-5.74	-5.48
Auxiliary Power Consumption					
Guaranteed Aux. Power Load	kW	6,100	6,100	6,100	6,100
Measured Aux. Power Load	kW	5,493	5,501	5,303	5,432
Corrected Aux. Power Load	**kW**	**5,089**	**5,071**	**4,935**	**5,031**
Margin from Guarantee	kW	-1,011	-1,029	-1,165	-1,069
	%	-16.58	-16.87	-19.10	-17.52
Steam Temperature at Outlet					
Guaranteed Outlet Temperature	°F	1,005	1,005	1,005	1,005
Measured Outlet Temperature	**°F**	**998.4**	**998.7**	**998.8**	**998.7**
Margin from Guarantee	°F	-6.6	-6.3	-6.2	-6.3
	%	-0.65	-0.63	-0.62	-0.63

5.3 Results Uncertainty

Uncertainty calculated using the methods described in PTC 19.1. It was assumed that flue gas constituent spatial uncertainty was proportional to the flue gas temperature spatial uncertainty.

Table 5-3: Performance Test Uncertainty

Description	Units	Test 1	Test 2	Test 3	Test Average
Corrected Plant Net Output	%	0.44	0.45	0.45	0.50
Corrected Plant Net Heat Rate	%	2.64	3.62	3.11	2.71
Corrected Boiler Flow	%	1.07	1.07	1.07	1.12
Corrected Fuel Heat Input	%	2.61	3.62	3.10	2.62
Corrected Auxiliary Load	%	1.08	1.09	1.14	2.10

5.4 Plant Conclusions

The results show that the Plant Performance is passing both the Electrical Output and Cycle Heat Rate guarantees. As shown in the test results, the Plant Net Electrical Output is passing by a small amount while the Plant Net Heat Rate is passing by a large amount. The following sections attempt to explain some of the phenomena causing these passing margins.

5.4.1 Plant Performance Specified Disposition

In the setup of the performance test, the procedure was design to be flexible in relation to the performance test load. This was selected as the performance guarantee basis conditions did not explicitly state the plant load for the basis of the guarantee. During the performance test, the plant was operated at a steam flow less than the design 98% MCR steam flow and load. This reduced load had the impact to lower the power output of the plant during the test, while also reducing the heat input for the test. The test results were not corrected for the test disposition being at a lower load than the design case. If it can be shown that the plant can operate at an increased load following the correction of the turbine throttle valve, the plant net power output would increase with the increase in boiler load.

5.4.2 Design Heat Balance Heat Rate vs. Contract Guaranteed Heat Rate

It is observed in the design case heat balance (drawing B014200-CHB00002 Sheet 1 Rev 0), the heat rate is shown to be 12,475 Btu/kWh HHV while in the Contract guarantee, the heat rate is shown to be 12,559 Btu/kWh HHV.

5.4.3 Plant and Boiler Design Basis

In the analysis of the plant and boiler design basis, it is observed that the design information is not at the same basis conditions for all performance parameters. For example, in the design heat balance for the plant, the feedwater flow is shown to be 909,209 lb/hr, while in the predicted performance data for the boiler, the feedwater is shown to be 907,640 lb/hr.

5.4.4 Steam Turbine Performance

During the plant performance test, the steam turbine generator performed consistent with the PTC6 steam turbine performance test conducted on 11/20/2013.

5.4.5 Auxiliary Load Power Consumption

As shown in the above data tables, the auxiliary power consumption was substantially less than the design power consumption.

5.5 Boiler Conclusions

Due to the valve chatter experienced at the time of the test, the load was not increased further, as described in Section 2.2.1. As a result, the Boiler Steam Output could not be demonstrated during this performance test.

Appendices

Appendix		Title
A.	**Test Data**	
	A.1	All Instrument Measurements
	A.2	Checklists
B.	**Instrument Calibration Reports**	
C.	**Supporting Calculations**	
D.	**Uncertainty Calculations**	
E.	**Fuel and Ash Analysis**	

APPENDIX A

Test Data

Raw Test Data was collected for a variety of instruments and sources. This data has been sorted into two main groupings as defined by the list below.

A.1 All Instrument Measurements
A.2 Checklists

APPENDIX A.1

All Instrument Measurements

Temporary measurements include temperatures and pressures throughout the steam cycle. These measurements were collected using calibrated temporary instruments and recorded using the McHale Data Acquisition System (MDAS). Other data was collected electronically using permanent plant instruments and recorded using the Distributed Controls System (DCS). Electronic data was distributed to all Parties at the conclusion of testing.

See attached electronic file: Plant Test Gainesville DAS Tabs Rev P

APPENDIX A.2

Checklists

Manual datasheets and checklists used in the course of testing have been scanned and included here for reference. Pertinent manual data was distributed to all Parties at the conclusion of testing.

Appendix D.1

Pre Test Checklist

Date 11/21/13 Time 10:00 a

FAGAN GAINESVILLE PROJECT
PERFORMANCE TEST
PRE-TEST CHECKLIST / SYSTEM LINE-UP

A. PRE-TEST LINEUP ACTIVITIES

- [x] Operate boiler to obtain chemical stability, typically 24 hours
- [x] Operate a Complete Soot blowing Schedule Prior to the Performance Test
- [x] Soot blowing shall be isolated for at least one hour prior to the Performance Test
- [x] Supplemental Fuel Burners Shall be secured and verified off throughout the Performance Test
- [x] Operate plant for an adequate period to meet the Operating Parameter Deviations called out in Table 3-2-1 in PTC 4 -2008

B. OPERATING MODE

- [x] ~~Turbine Follow, Sliding Pressure~~ THROTTLE PRESSURE
- [x] Cycle Isolated STEAM TO BAIN SYSTEM
- [x] Equipment Lineup according to Equipment Operation List
- [x] Boiler Continuous Blowdown closed. Correction for 1% blowdown will be completed post test
- [ ] Make-up Isolated I/S PER UNIT DEMAND
- [ ] Operation is in steady-state, stable operation, as defined in the Test Procedure ALL BUT MW-CV CHATTER
- [x] Emissions are within the limits defined in the plant Permits

C. SYSTEMS IN AUTOMATIC OPERATION

- [x] Boiler Feedwater
- [x] Demineralized Water
- [x] Drum Level in the most stable control mode
- [x] Superheater Attemperation
- [x] SJAE
- [x] Turbine Steam Seals
- [x] CEMS, SCR, and any other Emissions Control Systems
- [x] Water Sampling and Analysis
- [ ]

Date 11-21-13 Time 10:00

- [x] Chemical Feeds
- [x] Service Water
- [x] Waste Water
- [x] Cooling Systems
- [x] Boiler Fuel Supply Systems
- [x] Non-Operating Equipment in Normal Standby Mode
- [x] Compressed Air
- [x] HVAC / Lighting
- [x] DC Power Supply
- [x] Safety Systems (i.e. Fire Protection, Relief Valves, etc.)

D. SYSTEMS IN MANUAL OPERATION

- [x] Fuel Input Set point to maintain Main Steam conditions

E. SYSTEMS NOT IN OPERATION (during Performance Test runs)

- [x] Auxiliary Steam (unless supplying steam to essential systems such as Steam Seals, SJAP, Air pre-heat coils if required, Etc.
- [x] Intermittent Boiler Blowdown
- [x] Soot Blowing
- [x] Condensate Storage
- [x] HP/LP Steam Dumps
- [x] Steam bypass operations (HP/LP Letdown)
- [x] Auxiliary Fuel Burners

F. DATA COLLECTION

- [x] DCS and MDAS Data acquisition systems active (≤1 minute intervals)
- [x] CEM data acquisition system active
- [x] Primary measurements are calibrated
- [x] Primary measurements are verified against station and local transmitters
- [ ] Manual Data forms are available
- [ ] Manual Data takers are available and trained in their duties
- [x] Fuel sample collection buckets, mixing barrels and adequate number of sample containers are available and at testing location
- [x] Measuring Container (dumpster) empty and manpower and equipment in place to move into place at ash dump location
- [x] Personnel are available, trained and ready for all sampling
- [ ] Access authorization & keys are available for data takers (if required)
- [x] Local test instruments inspected (power, isolation, ladders, etc.)
- [x] Test personnel and data acquisition systems synchronize time to the DCS clock

G. TEST PERSONNEL

Date 11/21/13 Time 10:00

The following list of people are present on site to witness and

Position / Responsibility	Signature	Company
Owner Witness		GREC
Contractor Witness		Fagen Inc
Test Director		McHACE
Manufacturer Witness(es)		MGTSO
Operator(s)		GREC
DCS Support		
Data Collector(s)		
Other:		Black & Veatch

H. TEST PROTOCOL

☐ Performance Test Procedure Revision ____

Appendix D.1

Pre Test Checklist

Date 11/21/13 Time 14:00

FAGAN GAINESVILLE PROJECT
PERFORMANCE TEST
PRE-TEST CHECKLIST / SYSTEM LINE-UP

A. PRE-TEST LINEUP ACTIVITIES

- [✓] Operate boiler to obtain chemical stability, typically 24 hours
- [N/A] Operate a Complete Soot blowing Schedule Prior to the Performance Test
- [✓] Soot blowing shall be isolated for at least one hour prior to the Performance Test
- [✓] Supplemental Fuel Burners Shall be secured and verified off throughout the Performance Test
- [✓] Operate plant for an adequate period to meet the Operating Parameter Deviations called out in Table 3-2-1 in PTC 4 -2008

B. OPERATING MODE

- [✓] ~~Turbine Follow, Sliding Pressure~~ THROTTLE PRESSURE
- [✓] Cycle Isolated STEAM TO BRINE SYSTEM
- [✓] Equipment Lineup according to Equipment Operation List
- [✓] Boiler Continuous Blowdown closed. Correction for 1% blowdown will be completed post test
- [ ] Make-up Isolated I/S PER DEMAND
- [ ] Operation is in steady-state, stable operation, as defined in the Test Procedure TURBINE CV CHATTER
- [✓] Emissions are within the limits defined in the plant Permits

C. SYSTEMS IN AUTOMATIC OPERATION

- [✓] Boiler Feedwater
- [✓] Demineralized Water
- [✓] Drum Level in the most stable control mode
- [✓] Superheater Attemperation
- [✓] SJAE
- [✓] Turbine Steam Seals
- [✓] CEMS, SCR, and any other Emissions Control Systems
- [✓] Water Sampling and Analysis
- [ ]

Date 11/21/2013 Time 1400

- [x] Chemical Feeds
- [x] Service Water
- [x] Waste Water
- [x] Cooling Systems
- [x] Boiler Fuel Supply Systems
- [x] Non-Operating Equipment in Normal Standby Mode
- [x] Compressed Air
- [x] HVAC / Lighting
- [x] DC Power Supply
- [x] Safety Systems (i.e. Fire Protection, Relief Valves, etc.)

D. SYSTEMS IN MANUAL OPERATION

- [x] Fuel Input Set point to maintain Main Steam conditions

E. SYSTEMS NOT IN OPERATION (during Performance Test runs)

- [x] Auxiliary Steam (unless supplying steam to essential systems such as Steam Seals, SJAP, Air pre-heat coils if required, Etc.
- [x] Intermittent Boiler Blowdown
- [x] Soot Blowing
- [ ] Condensate Storage
- [x] HP/LP Steam Dumps
- [x] Steam bypass operations (HP/LP Letdown)
- [x] Auxiliary Fuel Burners

F. DATA COLLECTION

- [x] DCS and MDAS Data acquisition systems active (≤1 minute intervals)
- [x] CEM data acquisition system active
- [x] Primary measurements are calibrated
- [x] Primary measurements are verified against station and local transmitters
- [ ] Manual Data forms are available
- [ ] Manual Data takers are available and trained in their duties
- [x] Fuel sample collection buckets, mixing barrels and adequate number of sample containers are available and at testing location
- [x] Measuring Container (dumpster) empty and manpower and equipment in place to move into place at ash dump location
- [x] Personnel are available, trained and ready for all sampling
- [ ] Access authorization & keys are available for data takers (if required)
- [x] Local test instruments inspected (power, isolation, ladders, etc.)
- [x] Test personnel and data acquisition systems synchronize time to the DCS clock

G. TEST PERSONNEL

Date 11/21/13 Time 1400

The following list of people are present on site to witness and

Position / Responsibility	Signature	Company
Owner Witness		GREC
Contractor Witness		Fagen Inc
Test Director		McHALE
Manufacturer Witness(es)		MFGS0
Operator(s)		GREC
DCS Support		
Data Collector(s)		
Other:		Black & Veatch

H. TEST PROTOCOL

☐ Performance Test Procedure Revision ____

Appendix D.1

Pre Test Checklist

Date 11/21/2013 Time 1800

FAGAN GAINESVILLE PROJECT
PERFORMANCE TEST
PRE-TEST CHECKLIST / SYSTEM LINE-UP

A. PRE-TEST LINEUP ACTIVITIES

- [x] Operate boiler to obtain chemical stability, typically 24 hours
- [x] N/A Operate a Complete Soot blowing Schedule Prior to the Performance Test
- [x] Soot blowing shall be isolated for at least one hour prior to the Performance Test
- [x] Supplemental Fuel Burners Shall be secured and verified off throughout the Performance Test
- [x] Operate plant for an adequate period to meet the Operating Parameter Deviations called out in Table 3-2-1 in PTC 4 -2008

B. OPERATING MODE

- [x] ~~Turbine Follow, Sliding Pressure~~ THROTTLE PRESSURE
- [x] Cycle Isolated STEAM TO BRINE SYSTEM
- [x] Equipment Lineup according to Equipment Operation List
- [x] Boiler Continuous Blowdown closed. Correction for 1% blowdown will be completed post test
- [ ] Make-up Isolated I/S PER DEMAND
- [ ] Operation is in steady-state, stable operation, as defined in the Test Procedure TURBINE CV CHATTER
- [x] Emissions are within the limits defined in the plant Permits

C. SYSTEMS IN AUTOMATIC OPERATION

- [x] Boiler Feedwater
- [x] Demineralized Water
- [x] Drum Level in the most stable control mode
- [x] Superheater Attemperation
- [x] SJAE
- [x] Turbine Steam Seals
- [x] CEMS, SCR, and any other Emissions Control Systems
- [x] Water Sampling and Analysis
- [ ]

Date 11/21/2013 Time 1800

- [x] Chemical Feeds
- [x] Service Water
- [x] Waste Water
- [x] Cooling Systems
- [x] Boiler Fuel Supply Systems
- [x] Non-Operating Equipment in Normal Standby Mode
- [x] Compressed Air
- [x] HVAC / Lighting
- [x] DC Power Supply
- [x] Safety Systems (i.e. Fire Protection, Relief Valves, etc.)

D. SYSTEMS IN MANUAL OPERATION

- [x] Fuel Input Set point to maintain Main Steam conditions

E. SYSTEMS NOT IN OPERATION (during Performance Test runs)

- [x] Auxiliary Steam (unless supplying steam to essential systems such as Steam Seals, SJAP, Air pre-heat coils if required, Etc.
- [x] Intermittent Boiler Blowdown
- [x] Soot Blowing
- [ ] Condensate Storage
- [x] HP/LP Steam Dumps
- [x] Steam bypass operations (HP/LP Letdown)
- [x] Auxiliary Fuel Burners

F. DATA COLLECTION

- [x] DCS and MDAS Data acquisition systems active (≤1 minute intervals)
- [x] CEM data acquisition system active
- [x] Primary measurements are calibrated
- [x] Primary measurements are verified against station and local transmitters
- [ ] Manual Data forms are available
- [ ] Manual Data takers are available and trained in their duties
- [x] Fuel sample collection buckets, mixing barrels and adequate number of sample containers are available and at testing location
- [x] Measuring Container (dumpster) empty and manpower and equipment in place to move into place at ash dump location
- [x] Personnel are available, trained and ready for all sampling
- [ ] Access authorization & keys are available for data takers (if required)
- [x] Local test instruments inspected (power, isolation, ladders, etc.)
- [x] Test personnel and data acquisition systems synchronize time to the DCS clock

G. TEST PERSONNEL

Date 11/21/2013 Time 1800

The following list of people are present on site to witness and

Position / Responsibility	Signature	Company
Owner Witness	(FOR L. FAGAN)	NAES
Contractor Witness		Fagen Inc
Test Director		McHALE
Manufacturer Witness(es)		MITSO
Operator(s)		GREC
DCS Support		
Data Collector(s)		
Other:		Black + Veatch

H. TEST PROTOCOL

☐ Performance Test Procedure Revision ____

Appendix D.3
Post Test Checklist

FAGAN GAINESVILLE BIOMASS PROJECT
PERFORMANCE TEST
POST-TEST CHECKLIST

A. DATA RECORDING

- [x] Collect all Manual Data
- [x] Collect all DCS Data
- [x] Collect all MDAS Data
- [x] Verify that all measurements recorded a sufficient quantity of good data points
- [x] Verify the stability throughout the Performance Test
- [x] Verify that all samples are collected
- [x] Verify water legs have been measured for all steam pressure measurements

The following Parties recognize that they have received a copy of the Test Data & SAMPLES

Position / Responsibility	MDAS	DCS	Manual
Owner Witness			
Contractor Witness			
Test Director			
Lender or Designee			
Manufacturer Witness(es)			

- Collect and review the Performance Test Data.
- Verify the primary measurements against the secondary measurements and station indications.
- Review Test Interruptions and Upsets, including writing and obtaining signatures for all deviations to the Test Procedure.
- Return the Cycle Isolation, System Line-up, and Equipment Operation to the "Normal" unit operating conditions.
- Release the operation of back to Operations.

APPENDIX B

Instrument Calibration Reports

Calculations of the Corrected Turbine Performance are based on a combination of measurement locations which include both temporary and station instruments. The calibration records for the temporary instruments used are provided here. No calibration records are available for the DCS permanent plant instruments.

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	27 September 2013
SERIAL NUMBER:	7237	CAL DUE:	27 September 2014
ASSET NUMBER:	21608	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	24.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	59 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	125-1100 Deg F

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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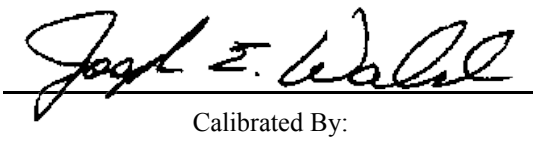
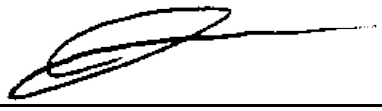
REMARKS: Operating within tolerance as left with new coefficients.



Calibrated By:



Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10261	Hart Scientific 1529 Thermometer Chub-E4	23202	12/6/2012	12/6/2013
14016	Rosemount Aerospace 162CE SPRT	4211	5/16/2013	5/16/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT021608						
Probe Calibration Range = 125 to 1100 Deg F = 51.7 to 593.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 119.74917 Ohms						
123.2930 F	123.282F	0.5000F	2.2	Pass	1.2e-001F	
Resistance Value at Temp = 153.89317 Ohms						
285.1160 F	285.114F	0.5000F	0.4	Pass	1.2e-001F	
Resistance Value at Temp = 187.13767 Ohms						
447.0160 F	447.047F	0.5000F	6.2	Pass	1.2e-001F	
Resistance Value at Temp = 219.44267 Ohms						
608.8730 F	608.887F	0.5000F	2.8	Pass	1.2e-001F	
Resistance Value at Temp = 250.8165 Ohms						
770.6930 F	770.669F	0.5000F	4.8	Pass	1.2e-001F	
Resistance Value at Temp = 281.2715 Ohms						
932.4920 F	932.453F	0.5000F	7.8	Pass	1.2e-001F	
Resistance Value at Temp = 310.83533 Ohms						
1094.3640 F	1094.395F	0.5000F	6.2	Pass	1.2e-001F	
**********Degrees C**********						
Resistance Value at Temp = 119.74917 Ohms						
50.7180 c	50.712c	0.2780c	2.16	Pass	6.4e-002c	
Resistance Value at Temp = 153.89317 Ohms						
140.6200 c	140.619c	0.2780c	0.36	Pass	6.4e-002c	
Resistance Value at Temp = 187.13767 Ohms						
230.5640 c	230.582c	0.2780c	6.47	Pass	6.4e-002c	
Resistance Value at Temp = 219.44267 Ohms						
320.4850 c	320.493c	0.2780c	2.88	Pass	6.4e-002c	
Resistance Value at Temp = 250.8165 Ohms						
410.3850 c	410.371c	0.2780c	5.04	Pass	6.4e-002c	
Resistance Value at Temp = 281.2715 Ohms						
500.2740 c	500.252c	0.2780c	7.91	Pass	6.4e-002c	
Resistance Value at Temp = 310.83533 Ohms						
590.2020 c	590.220c	0.2780c	6.47	Pass	6.4e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.08435
Alpha= 0.003846444
Delta= 1.4782135908
A= 0.00390330265797
B= -5.68586579705e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**Rosemount 3051CD2 Press. Transmitter, Diff.**	TEST RESULT:	**PASS**
		CAL DATE:	16 October 2013
SERIAL NUMBER:	1118309	CAL DUE:	16 October 2014
ASSET NUMBER:	1170	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital Pressure Transmitter (inH2O@20c)	TEMPERATURE:	23.00 ▪C
PROCEDURE REV.:	1 - 06/21/12	HUMIDITY:	66 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	0-100 In-H20

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
14025	DH Instruments PPC4 Pressure Controller/Calibrator	217	5/28/2013	5/28/2014
14052	DH Instruments RPM4 Pressure Controller/Calibrator	1067	5/29/2013	5/29/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Transmitter Tag = PTD01170						
Calibrated Span = 100 inH2O						
Calibration Tolerance = 0.065 inH2O						
Upscale Tests						
0.0000 inH2O	0.000inH2O	0.0650inH2O	0	Pass	5.8e-003inH2O	
25.0000 inH2O	25.001inH2O	0.0650inH2O	1.54	Pass	5.8e-003inH2O	
50.0000 inH2O	50.007inH2O	0.0650inH2O	10.8	Pass	5.8e-003inH2O	
75.0000 inH2O	75.003inH2O	0.0650inH2O	4.62	Pass	6.0e-003inH2O	
100.0000 inH2O	100.013inH2O	0.0650inH2O	20	Pass	8.0e-003inH2O	
Downscale Tests						
100.0000 inH2O	100.020inH2O	0.0650inH2O	30.8	Pass	8.0e-003inH2O	
75.0000 inH2O	75.021inH2O	0.0650inH2O	32.3	Pass	6.0e-003inH2O	
50.0000 inH2O	50.001inH2O	0.0650inH2O	1.54	Pass	5.8e-003inH2O	
25.0000 inH2O	25.005inH2O	0.0650inH2O	7.69	Pass	5.8e-003inH2O	
0.0000 inH2O	-0.003inH2O	0.0650inH2O	4.62	Pass	5.8e-003inH2O	

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**Rosemount 3051CA4 Press. Transmitter, Abs.**	TEST RESULT:	**PASS**
		CAL DATE:	19 September 2013
SERIAL NUMBER:	1330719	CAL DUE:	19 September 2014
ASSET NUMBER:	20751	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Pressure Transmitter - PSIA/DW M2000	TEMPERATURE:	23.00 ▪C
PROCEDURE REV.:	3 - 10/11/12	HUMIDITY:	66 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	0-3000 psia

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
7214	Pressurements M2000/3 Hydraulic Dead Weight Tester	13715-1	11/9/2011	11/9/2013

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Environmental Conditions						
Temperature: 23.2C, Humidity: 65.4%Rh, Barometric Pressure: 14.2322PSIA						
Transmitter Calibration Range= 3000 psia						
Transmitter Accuracy= 1.95 psia						
********** AS FOUND/AS LEFT **********						
--- Upscale Pressure Tests (DIGITAL) ---						
14.2320 psi	14.278psi	1.9500psi	2.36	Pass	2.2e-003psi	
752.9320 psi	752.175psi	1.9500psi	38.8	Pass	1.1e-001psi	
1502.1390 psi	1501.625psi	1.9500psi	26.4	Pass	2.3e-001psi	
2251.3460 psi	2251.466psi	1.9500psi	6.15	Pass	3.4e-001psi	
3000.5540 psi	3000.633psi	1.9500psi	4.05	Pass	4.5e-001psi	
--- Downscale Pressure Tests (DIGITAL) ---						
3000.5540 psi	3001.228psi	1.9500psi	34.6	Pass	4.5e-001psi	
2251.3460 psi	2251.280psi	1.9500psi	3.38	Pass	3.4e-001psi	
1502.1390 psi	1501.444psi	1.9500psi	35.6	Pass	2.3e-001psi	
752.9320 psi	752.023psi	1.9500psi	46.6	Pass	1.1e-001psi	
14.2320 psi	13.701psi	1.9500psi	27.2	Pass	2.2e-003psi	

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	27 September 2013
SERIAL NUMBER:	10818	CAL DUE:	27 September 2014
ASSET NUMBER:	10509	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	24.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	59 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	125-1100 Deg F

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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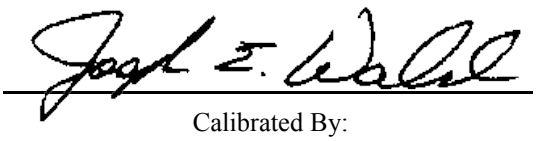
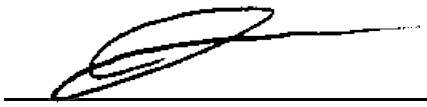
REMARKS: Operating within tolerance as left with new coefficients.



Calibrated By:



Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10261	Hart Scientific 1529 Thermometer Chub-E4	23202	12/6/2012	12/6/2013
22147	Rosemount Aerospace 162CE SPRT	3984	7/25/2013	7/25/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT010509						
Probe Calibration Range = 125 to 1100 Deg F = 51.7 to 593.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 119.98117 Ohms						
123.8350 F	123.796F	0.5000F	7.8	Pass	1.2e-001F	
Resistance Value at Temp = 154.2535 Ohms						
285.6000 F	285.597F	0.5000F	0.6	Pass	1.2e-001F	
Resistance Value at Temp = 187.62867 Ohms						
447.5170 F	447.614F	0.5000F	19.4	Pass	1.2e-001F	
Resistance Value at Temp = 220.01883 Ohms						
609.3650 F	609.420F	0.5000F	11	Pass	1.2e-001F	
Resistance Value at Temp = 251.436 Ohms						
771.1370 F	771.060F	0.5000F	15.4	Pass	1.2e-001F	
Resistance Value at Temp = 281.91333 Ohms						
932.8380 F	932.696F	0.5000F	28.4	Pass	1.2e-001F	
Resistance Value at Temp = 311.51067 Ohms						
1094.5490 F	1094.661F	0.5000F	22.4	Pass	1.2e-001F	
**********Degrees C**********						
Resistance Value at Temp = 119.98117 Ohms						
51.0200 c	50.998c	0.2780c	7.91	Pass	6.4e-002c	
Resistance Value at Temp = 154.2535 Ohms						
140.8890 c	140.887c	0.2780c	0.719	Pass	6.4e-002c	
Resistance Value at Temp = 187.62867 Ohms						
230.8430 c	230.896c	0.2780c	19.1	Pass	6.4e-002c	
Resistance Value at Temp = 220.01883 Ohms						
320.7580 c	320.789c	0.2780c	11.2	Pass	6.4e-002c	
Resistance Value at Temp = 251.436 Ohms						
410.6320 c	410.589c	0.2780c	15.5	Pass	6.4e-002c	
Resistance Value at Temp = 281.91333 Ohms						
500.4660 c	500.387c	0.2780c	28.4	Pass	6.4e-002c	
Resistance Value at Temp = 311.51067 Ohms						
590.3050 c	590.367c	0.2780c	22.3	Pass	6.4e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.11886
Alpha= 0.003861634
Delta= 1.50611392872
A= 0.00391979460755
B= -5.81606075502e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**Rosemount 3051CA4 Press. Transmitter, Abs.**	TEST RESULT:	**PASS**
		CAL DATE:	19 September 2013
SERIAL NUMBER:	1097947	CAL DUE:	19 September 2014
ASSET NUMBER:	24568	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Pressure Transmitter - PSIA/DW M2000	TEMPERATURE:	23.00 ▪C
PROCEDURE REV.:	3 - 10/11/12	HUMIDITY:	66 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	0-2000 psia

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
7214	Pressurements M2000/3 Hydraulic Dead Weight Tester	13715-1	11/9/2011	11/9/2013

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Environmental Conditions						
Temperature: 23.2C, Humidity: 65.4%Rh, Barometric Pressure: 14.2502PSIA						
Transmitter Calibration Range= 2000 psia						
Transmitter Accuracy= 1.3 psia						
********** AS FOUND/AS LEFT **********						
--- Upscale Pressure Tests (DIGITAL) ---						
14.2500 psi	14.279psi	1.3000psi	2.23	Pass	2.2e-003psi	
503.2140 psi	503.250psi	1.3000psi	2.77	Pass	7.5e-002psi	
1002.6850 psi	1002.656psi	1.3000psi	2.23	Pass	1.5e-001psi	
1502.1570 psi	1502.406psi	1.3000psi	19.2	Pass	2.3e-001psi	
2001.6280 psi	2002.188psi	1.3000psi	43.1	Pass	3.0e-001psi	
--- Downscale Pressure Tests (DIGITAL) ---						
2001.6280 psi	2002.125psi	1.3000psi	38.2	Pass	3.0e-001psi	
1502.1570 psi	1502.594psi	1.3000psi	33.6	Pass	2.3e-001psi	
1002.6850 psi	1002.703psi	1.3000psi	1.38	Pass	1.5e-001psi	
503.2140 psi	503.344psi	1.3000psi	10	Pass	7.5e-002psi	
14.2500 psi	14.279psi	1.3000psi	2.23	Pass	2.2e-003psi	

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**Rosemount 3051CA1 Abs. Press. Transmitter**	TEST RESULT:	**PASS**
		CAL DATE:	21 June 2013
SERIAL NUMBER:	1396611	CAL DUE:	21 June 2014
ASSET NUMBER:	11403	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital Pressure Transmitter (PSI)	TEMPERATURE:	24.00 °C
PROCEDURE REV.:	0 - 08/25/09	HUMIDITY:	60 %
CALIBRATED BY:	Grant Shropshire		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	10-15 psia

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
14025	DH Instruments PPC4 Pressure Controller/Calibrator	217	5/28/2013	5/28/2014
14052	DH Instruments RPM4 Pressure Controller/Calibrator	1067	5/29/2013	5/29/2014

Test Results

Transmitter Tag = PTA11403
Calibrated Span = 5 PSI
Calibration Tolerance = 0.00325 PSI

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Upscale Tests						
10.0000 psi	10.001psi	0.00325psi	30.8	Pass	9.9e-004psi	
11.2500 psi	11.250psi	0.00325psi	0	Pass	1.1e-003psi	3.61
12.5000 psi	12.501psi	0.00325psi	30.8	Pass	1.2e-003psi	3.25
13.7500 psi	13.751psi	0.00325psi	30.8	Pass	1.2e-003psi	2.95
15.0000 psi	15.001psi	0.00325psi	30.8	Pass	1.3e-003psi	2.71
Downscale Tests						
15.0000 psi	15.001psi	0.00325psi	30.8	Pass	1.3e-003psi	2.71
13.7500 psi	13.751psi	0.00325psi	30.8	Pass	1.2e-003psi	2.95
12.5000 psi	12.501psi	0.00325psi	30.8	Pass	1.2e-003psi	3.25
11.2500 psi	11.250psi	0.00325psi	0	Pass	1.1e-003psi	3.61
10.0000 psi	10.000psi	0.00325psi	0	Pass	9.9e-004psi	

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	19 August 2013
SERIAL NUMBER:	07328	CAL DUE:	19 August 2014
ASSET NUMBER:	21680	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left with new coefficients

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT021680						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 97.63133 Ohms						
20.4520 F	20.445F	0.2590F	2.7	Pass	3.4e-002F	
Resistance Value at Temp = 104.0945 Ohms						
50.4110 F	50.414F	0.2590F	1.16	Pass	3.4e-002F	
Resistance Value at Temp = 110.526 Ohms						
80.3680 F	80.382F	0.2590F	5.41	Pass	3.4e-002F	
Resistance Value at Temp = 116.938 Ohms						
110.4030 F	110.404F	0.2590F	0.386	Pass	3.4e-002F	
Resistance Value at Temp = 123.319 Ohms						
140.4400 F	140.427F	0.2590F	5.02	Pass	3.4e-002F	
Resistance Value at Temp = 129.68283 Ohms						
170.5230 F	170.517F	0.2590F	2.32	Pass	3.4e-002F	
Resistance Value at Temp = 136.02067 Ohms						
200.6250 F	200.633F	0.2590F	3.09	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 97.63133 Ohms						
-6.4160 c	-6.420c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 104.0945 Ohms						
10.2280 c	10.230c	0.1440c	1.39	Pass	1.9e-002c	
Resistance Value at Temp = 110.526 Ohms						
26.8710 c	26.879c	0.1440c	5.56	Pass	1.9e-002c	
Resistance Value at Temp = 116.938 Ohms						
43.5570 c	43.558c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 123.319 Ohms						
60.2450 c	60.237c	0.1440c	5.56	Pass	1.9e-002c	
Resistance Value at Temp = 129.68283 Ohms						
76.9570 c	76.954c	0.1440c	2.08	Pass	1.9e-002c	
Resistance Value at Temp = 136.02067 Ohms						
93.6810 c	93.685c	0.1440c	2.78	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.12702
Alpha= 0.003822908
Delta= 1.4674544991
A= 0.00387900743544
B= -5.60994354424e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	19 August 2013
SERIAL NUMBER:	2672	CAL DUE:	19 August 2014
ASSET NUMBER:	20183	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left with new coefficients

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT020183						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 97.6065 Ohms						
20.4520 F	20.449F	0.2590F	1.16	Pass	3.4e-002F	
Resistance Value at Temp = 104.09883 Ohms						
50.4110 F	50.409F	0.2590F	0.772	Pass	3.4e-002F	
Resistance Value at Temp = 110.5625 Ohms						
80.3680 F	80.379F	0.2590F	4.25	Pass	3.4e-002F	
Resistance Value at Temp = 117.00583 Ohms						
110.4030 F	110.400F	0.2590F	1.16	Pass	3.4e-002F	
Resistance Value at Temp = 123.4215 Ohms						
140.4400 F	140.437F	0.2590F	1.16	Pass	3.4e-002F	
Resistance Value at Temp = 129.81533 Ohms						
170.5230 F	170.518F	0.2590F	1.93	Pass	3.4e-002F	
Resistance Value at Temp = 136.18417 Ohms						
200.6250 F	200.629F	0.2590F	1.54	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 97.6065 Ohms						
-6.4160 c	-6.417c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 104.09883 Ohms						
10.2280 c	10.227c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 110.5625 Ohms						
26.8710 c	26.877c	0.1440c	4.17	Pass	1.9e-002c	
Resistance Value at Temp = 117.00583 Ohms						
43.5570 c	43.556c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 123.4215 Ohms						
60.2450 c	60.243c	0.1440c	1.39	Pass	1.9e-002c	
Resistance Value at Temp = 129.81533 Ohms						
76.9570 c	76.955c	0.1440c	1.39	Pass	1.9e-002c	
Resistance Value at Temp = 136.18417 Ohms						
93.6810 c	93.683c	0.1440c	1.39	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.11325
Alpha= 0.003842428
Delta= 1.45625681594
A= 0.00389838361965
B= -5.59556196476e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	19 August 2013
SERIAL NUMBER:	07216	CAL DUE:	19 August 2014
ASSET NUMBER:	21627	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

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Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left with new coefficients.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT021627						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 95.26767 Ohms						
20.4520 F	20.332F	0.2590F	46.3	Pass	3.4e-002F	
Resistance Value at Temp = 101.73867 Ohms						
50.4110 F	50.594F	0.2590F	70.7	Pass	3.4e-002F	
Resistance Value at Temp = 108.06383 Ohms						
80.3680 F	80.396F	0.2590F	10.8	Pass	3.4e-002F	
Resistance Value at Temp = 114.37717 Ohms						
110.4030 F	110.363F	0.2590F	15.4	Pass	3.4e-002F	
Resistance Value at Temp = 120.6515 Ohms						
140.4400 F	140.370F	0.2590F	27	Pass	3.4e-002F	
Resistance Value at Temp = 126.89883 Ohms						
170.5230 F	170.476F	0.2590F	18.1	Pass	3.4e-002F	
Resistance Value at Temp = 133.121 Ohms						
200.6250 F	200.691F	0.2590F	25.5	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 95.26767 Ohms						
-6.4160 c	-6.482c	0.1440c	45.8	Pass	1.9e-002c	
Resistance Value at Temp = 101.73867 Ohms						
10.2280 c	10.330c	0.1440c	70.8	Pass	1.9e-002c	
Resistance Value at Temp = 108.06383 Ohms						
26.8710 c	26.886c	0.1440c	10.4	Pass	1.9e-002c	
Resistance Value at Temp = 114.37717 Ohms						
43.5570 c	43.535c	0.1440c	15.3	Pass	1.9e-002c	
Resistance Value at Temp = 120.6515 Ohms						
60.2450 c	60.206c	0.1440c	27.1	Pass	1.9e-002c	
Resistance Value at Temp = 126.89883 Ohms						
76.9570 c	76.931c	0.1440c	18.1	Pass	1.9e-002c	
Resistance Value at Temp = 133.121 Ohms						
93.6810 c	93.717c	0.1440c	25	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 97.7684
Alpha= 0.003852883
Delta= 2.26279190879
A= 0.00394006572478
B= -8.71827247793e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	19 August 2013
SERIAL NUMBER:	07293	CAL DUE:	19 August 2014
ASSET NUMBER:	21691	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

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REMARKS: Operating within tolerance as left with new coefficients

Calibrated By: Joseph E. Walsh

Reviewed/Approved By: Grant Shipley

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT021691						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 97.56933 Ohms						
20.4520 F	20.444F	0.2590F	3.09	Pass	3.4e-002F	
Resistance Value at Temp = 104.09 Ohms						
50.4110 F	50.453F	0.2590F	16.2	Pass	3.4e-002F	
Resistance Value at Temp = 110.54517 Ohms						
80.3680 F	80.309F	0.2590F	22.8	Pass	3.4e-002F	
Resistance Value at Temp = 117.021 Ohms						
110.4030 F	110.413F	0.2590F	3.86	Pass	3.4e-002F	
Resistance Value at Temp = 123.45283 Ohms						
140.4400 F	140.464F	0.2590F	9.27	Pass	3.4e-002F	
Resistance Value at Temp = 129.85317 Ohms						
170.5230 F	170.521F	0.2590F	0.772	Pass	3.4e-002F	
Resistance Value at Temp = 136.22917 Ohms						
200.6250 F	200.619F	0.2590F	2.32	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 97.56933 Ohms						
-6.4160 c	-6.420c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 104.09 Ohms						
10.2280 c	10.251c	0.1440c	16	Pass	1.9e-002c	
Resistance Value at Temp = 110.54517 Ohms						
26.8710 c	26.838c	0.1440c	22.9	Pass	1.9e-002c	
Resistance Value at Temp = 117.021 Ohms						
43.5570 c	43.563c	0.1440c	4.17	Pass	1.9e-002c	
Resistance Value at Temp = 123.45283 Ohms						
60.2450 c	60.258c	0.1440c	9.03	Pass	1.9e-002c	
Resistance Value at Temp = 129.85317 Ohms						
76.9570 c	76.956c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 136.22917 Ohms						
93.6810 c	93.677c	0.1440c	2.78	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.08425
Alpha= 0.003851501
Delta= 1.52452329829
A= 0.00391021803008
B= -5.87170300789e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	29 August 2013
SERIAL NUMBER:	2494	CAL DUE:	29 August 2014
ASSET NUMBER:	20147	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

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Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left with new coefficients.

Calibrated By: Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT020147						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 96.72117 Ohms						
20.4560 F	20.449F	0.2590F	2.7	Pass	3.4e-002F	
Resistance Value at Temp = 103.17317 Ohms						
50.4130 F	50.422F	0.2590F	3.47	Pass	3.4e-002F	
Resistance Value at Temp = 109.59567 Ohms						
80.4040 F	80.411F	0.2590F	2.7	Pass	3.4e-002F	
Resistance Value at Temp = 115.99183 Ohms						
110.4370 F	110.430F	0.2590F	2.7	Pass	3.4e-002F	
Resistance Value at Temp = 122.361 Ohms						
140.4800 F	140.478F	0.2590F	0.772	Pass	3.4e-002F	
Resistance Value at Temp = 128.70767 Ohms						
170.5790 F	170.575F	0.2590F	1.54	Pass	3.4e-002F	
Resistance Value at Temp = 135.03467 Ohms						
200.7310 F	200.736F	0.2590F	1.93	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 96.72117 Ohms						
-6.4130 c	-6.417c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 103.17317 Ohms						
10.2290 c	10.234c	0.1440c	3.47	Pass	1.9e-002c	
Resistance Value at Temp = 109.59567 Ohms						
26.8910 c	26.895c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 115.99183 Ohms						
43.5760 c	43.572c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 122.361 Ohms						
60.2670 c	60.265c	0.1440c	1.39	Pass	1.9e-002c	
Resistance Value at Temp = 128.70767 Ohms						
76.9880 c	76.986c	0.1440c	1.39	Pass	1.9e-002c	
Resistance Value at Temp = 135.03467 Ohms						
93.7390 c	93.742c	0.1440c	2.08	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 99.21159
Alpha= 0.003848094
Delta= 1.54858318509
A= 0.00390768493663
B= -5.95909366306e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	29 August 2013
SERIAL NUMBER:	4033	CAL DUE:	29 August 2014
ASSET NUMBER:	21311	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

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Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left with new coefficients.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT021311						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 97.64667 Ohms						
20.4560 F	20.440F	0.2590F	6.18	Pass	3.4e-002F	
Resistance Value at Temp = 104.12133 Ohms						
50.4130 F	50.423F	0.2590F	3.86	Pass	3.4e-002F	
Resistance Value at Temp = 110.57283 Ohms						
80.4040 F	80.426F	0.2590F	8.49	Pass	3.4e-002F	
Resistance Value at Temp = 117.00033 Ohms						
110.4370 F	110.443F	0.2590F	2.32	Pass	3.4e-002F	
Resistance Value at Temp = 123.40017 Ohms						
140.4800 F	140.459F	0.2590F	8.11	Pass	3.4e-002F	
Resistance Value at Temp = 129.78967 Ohms						
170.5790 F	170.556F	0.2590F	8.88	Pass	3.4e-002F	
Resistance Value at Temp = 136.17283 Ohms						
200.7310 F	200.752F	0.2590F	8.11	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 97.64667 Ohms						
-6.4130 c	-6.422c	0.1440c	6.25	Pass	1.9e-002c	
Resistance Value at Temp = 104.12133 Ohms						
10.2290 c	10.235c	0.1440c	4.17	Pass	1.9e-002c	
Resistance Value at Temp = 110.57283 Ohms						
26.8910 c	26.903c	0.1440c	8.33	Pass	1.9e-002c	
Resistance Value at Temp = 117.00033 Ohms						
43.5760 c	43.580c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 123.40017 Ohms						
60.2670 c	60.255c	0.1440c	8.33	Pass	1.9e-002c	
Resistance Value at Temp = 129.78967 Ohms						
76.9880 c	76.975c	0.1440c	9.03	Pass	1.9e-002c	
Resistance Value at Temp = 136.17283 Ohms						
93.7390 c	93.751c	0.1440c	8.33	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.14613
Alpha= 0.003834128
Delta= 1.27967657235
A= 0.00388319243777
B= -4.90644377698e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	29 August 2013
SERIAL NUMBER:	5812	CAL DUE:	29 August 2014
ASSET NUMBER:	10180	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

McHale & Associates certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration complies with ANSI/NCSL Z540.1-1999 (R2002) and ISO/IEC 17025:2005.

Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left with new coefficients.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT010180						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 97.374 Ohms						
20.4560 F	20.458F	0.2590F	0.772	Pass	3.4e-002F	
Resistance Value at Temp = 103.9035 Ohms						
50.4130 F	50.434F	0.2590F	8.11	Pass	3.4e-002F	
Resistance Value at Temp = 110.37983 Ohms						
80.4040 F	80.377F	0.2590F	10.4	Pass	3.4e-002F	
Resistance Value at Temp = 116.82883 Ohms						
110.4370 F	110.405F	0.2590F	12.4	Pass	3.4e-002F	
Resistance Value at Temp = 123.24433 Ohms						
140.4800 F	140.492F	0.2590F	4.63	Pass	3.4e-002F	
Resistance Value at Temp = 129.62667 Ohms						
170.5790 F	170.641F	0.2590F	23.9	Pass	3.4e-002F	
Resistance Value at Temp = 135.94233 Ohms						
200.7310 F	200.693F	0.2590F	14.7	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 97.374 Ohms						
-6.4130 c	-6.412c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 103.9035 Ohms						
10.2290 c	10.241c	0.1440c	8.33	Pass	1.9e-002c	
Resistance Value at Temp = 110.37983 Ohms						
26.8910 c	26.876c	0.1440c	10.4	Pass	1.9e-002c	
Resistance Value at Temp = 116.82883 Ohms						
43.5760 c	43.558c	0.1440c	12.5	Pass	1.9e-002c	
Resistance Value at Temp = 123.24433 Ohms						
60.2670 c	60.273c	0.1440c	4.17	Pass	1.9e-002c	
Resistance Value at Temp = 129.62667 Ohms						
76.9880 c	77.023c	0.1440c	24.3	Pass	1.9e-002c	
Resistance Value at Temp = 135.94233 Ohms						
93.7390 c	93.718c	0.1440c	14.6	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 99.89353
Alpha= 0.003845412
Delta= 2.15141146245
A= 0.00392814263455
B= -8.27306345465e-007

***** End of Certificate *****

McHale Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**McHale D-RTD RTD, Digital, 4-Wire**	TEST RESULT:	**PASS**
		CAL DATE:	29 August 2013
SERIAL NUMBER:	2627	CAL DUE:	29 August 2014
ASSET NUMBER:	21167	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital RTD	TEMPERATURE:	23.00 °C
PROCEDURE REV.:	1 - 01/05/06	HUMIDITY:	65 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	20-200 Deg F

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REMARKS: Operating within tolerance as left with new coefficients.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
10256	Hart Scientific 5628 Platinum Resistance Thermometer	266	11/8/2012	11/8/2013
14021	Fluke 8508A Reference Multimeter	45963	2/11/2013	2/11/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Probe ID Number = TT021167						
Probe Calibration Range = 20 to 200 Deg F = -6.7 to 93.3 Deg C						
AS FOUND/AS LEFT RESULTS						
Degrees F						
Resistance Value at Temp = 97.85283 Ohms						
20.4560 F	20.451F	0.2590F	1.93	Pass	3.4e-002F	
Resistance Value at Temp = 104.38817 Ohms						
50.4130 F	50.415F	0.2590F	0.772	Pass	3.4e-002F	
Resistance Value at Temp = 110.899 Ohms						
80.4040 F	80.416F	0.2590F	4.63	Pass	3.4e-002F	
Resistance Value at Temp = 117.38033 Ohms						
110.4370 F	110.430F	0.2590F	2.7	Pass	3.4e-002F	
Resistance Value at Temp = 123.8365 Ohms						
140.4800 F	140.479F	0.2590F	0.386	Pass	3.4e-002F	
Resistance Value at Temp = 130.26967 Ohms						
170.5790 F	170.572F	0.2590F	2.7	Pass	3.4e-002F	
Resistance Value at Temp = 136.685 Ohms						
200.7310 F	200.736F	0.2590F	1.93	Pass	3.4e-002F	
**********Degrees C**********						
Resistance Value at Temp = 97.85283 Ohms						
-6.4130 c	-6.416c	0.1440c	2.08	Pass	1.9e-002c	
Resistance Value at Temp = 104.38817 Ohms						
10.2290 c	10.231c	0.1440c	1.39	Pass	1.9e-002c	
Resistance Value at Temp = 110.899 Ohms						
26.8910 c	26.898c	0.1440c	4.86	Pass	1.9e-002c	
Resistance Value at Temp = 117.38033 Ohms						
43.5760 c	43.572c	0.1440c	2.78	Pass	1.9e-002c	
Resistance Value at Temp = 123.8365 Ohms						
60.2670 c	60.266c	0.1440c	0.694	Pass	1.9e-002c	
Resistance Value at Temp = 130.26967 Ohms						
76.9880 c	76.985c	0.1440c	2.08	Pass	1.9e-002c	
Resistance Value at Temp = 136.685 Ohms						
93.7390 c	93.742c	0.1440c	2.08	Pass	1.9e-002c	

As Left Coefficients:
Equation Used= Callendar-Van Dusen
where T = Deg C and Rt = Resistance at Temp
T = [-RoA + Sqrt(Ro^2*A^2-4Ro*B(Ro-Rt))]/(2*Ro*B)
Ro= 100.37555
Alpha= 0.003855187
Delta= 1.51115481837
A= 0.00391344484411
B= -5.82578441078e-007

***** End of Certificate *****

McHale
Performance
4700 Coster Road Knoxville, TN 37912 Phone: 865-588-2654

Report of Calibration

UNIT UNDER TEST:	**Rosemount 3051S1CA0 Abs. Press. Transmitter**	TEST RESULT:	**PASS**
		CAL DATE:	05 June 2013
SERIAL NUMBER:	69830	CAL DUE:	05 June 2014
ASSET NUMBER:	1019	DATA TYPE:	AS-LEFT
PROCEDURE NAME:	Digital Pressure Transmitter (PSI)	TEMPERATURE:	24.00 °C
PROCEDURE REV.:	0 - 08/25/09	HUMIDITY:	60 %
CALIBRATED BY:	Joe Walsh		
CUSTOMER:	McHale & Associates 4700 Coster Rd. Knoxville, TN 37912	CAL RANGE:	0-5 psia

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Measurement uncertainties are calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement." Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2. Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

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REMARKS: Operating within tolerance as left.

Calibrated By:

Reviewed/Approved By:

Standards Used

Asset #	Description	Serial #	Cal Date	Due Date
14025	DH Instruments PPC4 Pressure Controller/Calibrator	217	5/28/2013	5/28/2014
14052	DH Instruments RPM4 Pressure Controller/Calibrator	1067	5/29/2013	5/29/2014

Test Results

Standard Reading	UUT Reading	Test Tol	% Tol Error	PASS/FAIL	Expanded Unc.	TUR
Transmitter Tag = PTA01019						
Calibrated Span = 5 PSI						
Calibration Tolerance = 0.00325 PSI						
Upscale Tests						
0.5000 psi	0.500psi	0.00325psi	0	Pass	6.1e-004psi	
1.2500 psi	1.250psi	0.00325psi	0	Pass	6.1e-004psi	
2.5000 psi	2.500psi	0.00325psi	0	Pass	6.1e-004psi	
3.7500 psi	3.750psi	0.00325psi	0	Pass	6.5e-004psi	
5.0000 psi	5.000psi	0.00325psi	0	Pass	7.0e-004psi	
Downscale Tests						
5.0000 psi	5.000psi	0.00325psi	0	Pass	7.0e-004psi	
3.7500 psi	3.750psi	0.00325psi	0	Pass	6.5e-004psi	
2.5000 psi	2.500psi	0.00325psi	0	Pass	6.1e-004psi	
1.2500 psi	1.250psi	0.00325psi	0	Pass	6.1e-004psi	
0.5000 psi	0.500psi	0.00325psi	0	Pass	6.1e-004psi	

***** End of Certificate *****

APPENDIX C

Supporting Calculations

FAGEN GAINESVILLE BOILER EFFICIENCY TEST STABILITY

DESCRIPTION	UNITS	SHORT-TERM FLUCTUATION	TEST RUN 1	PASS/ FAIL	TEST RUN 2	PASS/ FAIL	TEST RUN 3	PASS/ FAIL
Main Steam Pressure	%	4.00	1.66	FAIL	1.61	FAIL	2.10	FAIL
	psi max	25.00	26.84	FAIL	26.13	FAIL	34.03	FAIL
Main Steam Temperature	Deg F	20.00	6.82	PASS	8.09	PASS	10.72	PASS
Main Steam Flow	%	4.00	0.39	PASS	0.35	PASS	0.41	PASS
Feedwater Flow	%	10.00	0.66	PASS	0.72	PASS	0.75	PASS
Feedwater Temperature	Deg F	20.00	0.46	PASS	0.47	PASS	0.44	PASS
O2 Leaving Econ	%	1.00	12.15	FAIL	11.51	FAIL	10.61	FAIL
Bed Temperature	Deg F	50.00		PASS		PASS		PASS
Bed Pressure	"H2O	4.00		PASS		PASS		PASS
Sorbent/Biomas Ratio	%	4.00		PASS		PASS		PASS
Fuel Flow	%	10.00		PASS		PASS		PASS
SO2 (CEMS)	ppm	150.00	0.00	PASS	0.00	PASS	0.00	PASS
CO Leaving Econ (MDAS)	ppm	150.00	16.07	PASS	16.08	PASS	18.68	PASS
Power Factor	%	1.00	0.01	PASS	0.02	PASS	0.02	PASS
DESCRIPTION	**UNITS**	**LONG-TERM DEVIATION**	**TEST RUN 1**	**PASS/ FAIL**	**TEST RUN 2**	**PASS/ FAIL**	**TEST RUN 3**	**PASS/ FAIL**
Main Steam Pressure	%	3.00	1.07	PASS	1.44	FAIL	1.27	FAIL
	psi max	20.00	17.26	PASS	23.35	FAIL	20.57	FAIL
Main Steam Temperature	Deg F	10.00	4.16	PASS	5.00	PASS	6.06	PASS
Main Steam Flow	%	3.00	0.34	PASS	0.27	PASS	0.44	PASS
Feedwater Flow	%	3.00	0.53	PASS	0.50	PASS	0.89	PASS
Feedwater Temperature	Deg F	10.00	0.32	PASS	0.38	PASS	0.62	PASS
O2 Leaving Econ	%	0.50	7.51	FAIL	6.35	FAIL	7.18	FAIL
Bed Temperature	Deg F	50.00		PASS		PASS		PASS
Bed Pressure	"H2O	3.00		PASS		PASS		PASS
Sorbent/Biomas Ratio	%	2.00		PASS		PASS		PASS
SO2 (CEMS)	ppm	75.00	0.00	PASS	0.00	PASS	0.00	PASS
CO Leaving Econ (MDAS)	ppm	50.00	10.95	PASS	9.78	PASS	15.29	PASS

Auxiliary Power Manual Measurements

DESCRIPTION	UNITS	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Calculation Inputs					
Power Factor		**0.71**	**0.71**	**0.71**	**0.71**
Fuel Feed Left Drag Conveyor 1	Amps	18.5	19.0	18.5	**18.7**
Fuel Feed Righ Drag Conveyor 1	Amps	18.5	18.2	18.5	**18.4**
Fuel Feed Left Metering Screw 1	Amps	11.5	11.5	11.8	**11.6**
Fuel Feed Right Metering Screw 1	Amps	11.2	11.0	11.2	**11.1**
Fuel Feed Left Metering Screw 2	Amps	12.5	12.8	11.6	**12.3**
Fuel Feed Right Metering Screw 2	Amps	14.0	12.6	13.6	**13.4**
Fuel Feed Left Metering Screw 3	Amps	13.0	12.8	13.6	**13.1**
Fuel Feed Right Metering Screw 3	Amps	13.0	12.3	13.5	**12.9**
Fuel Silo 1 Reclaimer	Amps	80.0	82.0	79.0	**80.3**
Fuel Silo 2 Reclaimer	Amps	80.0	85.0	80.0	**81.7**
Fuel Feed Left Rotary Feeder 1	Amps	9.0	9.0	9.0	**9.0**
Fuel Feed Left Rotary Feeder 2	Amps	9.0	9.0	9.0	**9.0**
Fuel Feed Left Rotary Feeder 3	Amps	9.4	9.4	9.4	**9.4**
Fuel Feed Right Rotary Feeder 1	Amps	9.0	9.0	9.0	**9.0**
Fuel Feed Right Rotary Feeder 2	Amps	9.2	9.2	9.2	**9.2**
Fuel Feed Right Rotary Feeder 3	Amps	9.0	9.0	9.0	**9.0**
Fuel Silo 1 Lube Unit	Amps	1.0	1.0	1.0	**1.0**
Fuel Silo 2 Lube Unit	Amps	1.0	1.0	1.0	**1.0**
Fuel Silo 1 Rotating Spreader	Amps	1.6	1.6	1.6	**1.6**
Fuel Silo 2 Rotating Spreader	Amps	1.7	1.7	1.7	**1.7**
Fuel Silo 1 Turn Device	Amps	1.8	1.8	2.0	**1.8**
Fuel Silo 1 Turn Device	Amps	1.7	2.0	1.8	**1.8**
Fuel Silo 2 Turn Device	Amps	1.8	2.0	1.5	**1.8**
Fuel Silo 2 Turn Device	Amps	1.9	1.5	1.7	**1.7**
Baghouse Air Dryer 1	Amps	1.0	1.0	1.0	**1.0**
Baghouse Air Dryer 2	Amps	1.1	1.1	1.1	**1.1**
Baghouse Air Compressor 1	Amps	36.5	36.5	36.5	**36.5**
Baghouse Air Compressor 2	Amps	36.5	36.5	36.5	**36.5**
Sodium Bicarbonate Air Blower 1	Amps	16.0	16.0	16.0	**16.0**
Sodium Bicarbonate Rotary Airlock 1	Amps	0.9	0.9	0.9	**0.9**
Secondary Air Fan	kW	270.0	270.0	270.0	**270.0**
Fuel Feed Left Drag Conveyor 1	Volts	241.0	244.0	228.0	**237.7**
Fuel Feed Righ Drag Conveyor 1	Volts	250.0	244.0	253.0	**249.0**
Fuel Feed Left Metering Screw 1	Volts	245.0	248.0	250.0	**247.7**
Fuel Feed Right Metering Screw 1	Volts	240.0	243.0	241.0	**241.3**
Fuel Feed Left Metering Screw 2	Volts	227.0	234.0	232.0	**231.0**
Fuel Feed Right Metering Screw 2	Volts	242.0	243.0	242.0	**242.3**
Fuel Feed Left Metering Screw 3	Volts	250.0	250.0	247.0	**249.0**
Fuel Feed Right Metering Screw 3	Volts	242.0	243.0	242.0	**242.3**
Fuel Silo 1 Reclaimer	Volts	245.0	240.0	246.0	**243.7**
Fuel Silo 2 Reclaimer	Volts	264.0	244.0	279.0	**262.3**
Fuel Feed Left Rotary Feeder 1	Volts	480.0	480.0	480.0	**480.0**
Fuel Feed Left Rotary Feeder 2	Volts	480.0	480.0	480.0	**480.0**
Fuel Feed Left Rotary Feeder 3	Volts	480.0	480.0	480.0	**480.0**
Fuel Feed Right Rotary Feeder 1	Volts	480.0	480.0	480.0	**480.0**
Fuel Feed Right Rotary Feeder 2	Volts	480.0	480.0	480.0	**480.0**
Fuel Feed Right Rotary Feeder 3	Volts	480.0	480.0	480.0	**480.0**
Fuel Silo 1 Lube Unit	Volts	120.0	120.0	120.0	**120.0**
Fuel Silo 2 Lube Unit	Volts	120.0	120.0	120.0	**120.0**
Fuel Silo 1 Rotating Spreader	Volts	480.0	480.0	480.0	**480.0**
Fuel Silo 2 Rotating Spreader	Volts	480.0	480.0	480.0	**480.0**
Fuel Silo 1 Turn Device	Volts	480.0	480.0	480.0	**480.0**
Fuel Silo 1 Turn Device	Volts	480.0	480.0	480.0	**480.0**
Fuel Silo 2 Turn Device	Volts	480.0	480.0	480.0	**480.0**
Fuel Silo 2 Turn Device	Volts	480.0	480.0	480.0	**480.0**
Baghouse Air Dryer 1	Volts	120.0	120.0	120.0	**120.0**
Baghouse Air Dryer 2	Volts	120.0	120.0	120.0	**120.0**
Baghouse Air Compressor 1	Volts	480.0	480.0	480.0	**480.0**
Baghouse Air Compressor 2	Volts	480.0	480.0	480.0	**480.0**
Sodium Bicarbonate Air Blower 1	Volts	331.0	331.0	331.0	**331.0**
Sodium Bicarbonate Rotary Airlock 1	Volts	85.0	85.0	85.0	**85.0**
Dust Collector #2 Fan	Amps	13.6	13.6	13.6	**13.6**
Dust Collector #2	Amps	1.1	1.1	1.1	**1.1**
Dust Collector #3 Fan	Amps	5.5	5.5	5.5	**5.5**
Conveyor #10 Drive #1	Amps	11.5	11.5	11.5	**11.5**
Conveyor #9 Drive #1	Amps	54.2	54.2	54.2	**54.2**
Dust Collector #2 Fan	Volts	480.0	480.0	480.0	**480.0**
Dust Collector #2	Volts	480.0	480.0	480.0	**480.0**
Dust Collector #3 Fan	Volts	480.0	480.0	480.0	**480.0**
Conveyor #10 Drive #1	Volts	480.0	480.0	480.0	**480.0**
Conveyor #9 Drive #1	Volts	480.0	480.0	480.0	**480.0**

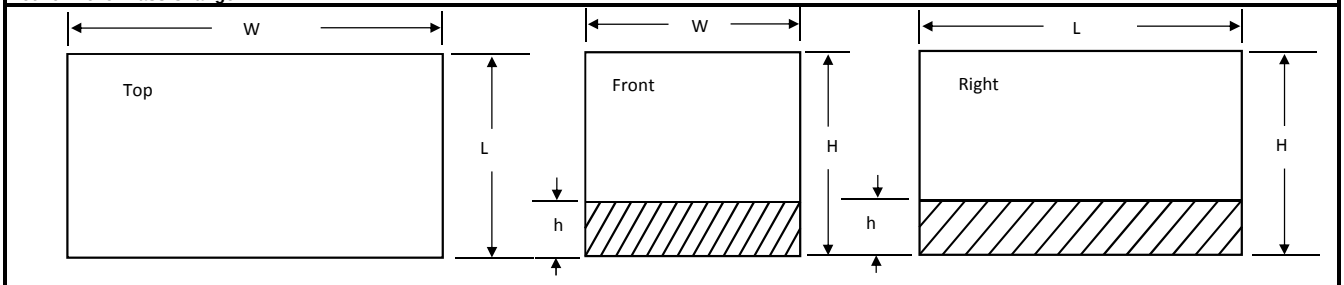
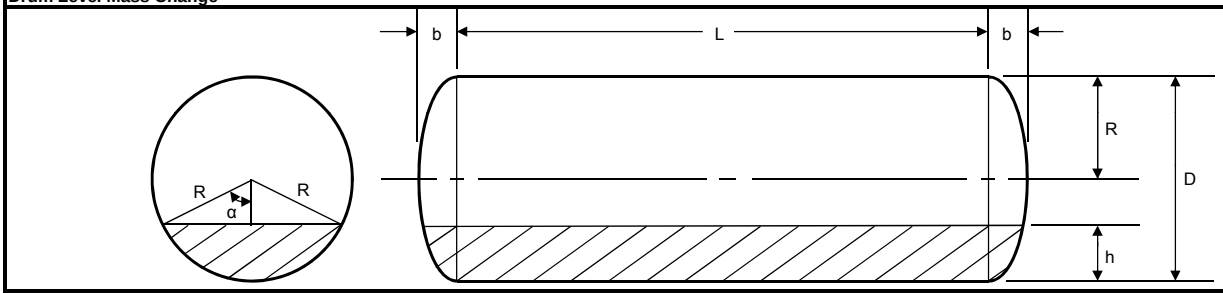
Auxiliary Power Manual Measurements

DESCRIPTION	UNITS	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Calculations					
Fuel Feed Left Drag Conveyor 1	kW	5.5	5.7	5.2	**5.4**
Fuel Feed Righ Drag Conveyor 1	kW	5.7	5.4	5.7	**5.6**
Fuel Feed Left Metering Screw 1	kW	3.5	3.5	3.6	**3.5**
Fuel Feed Right Metering Screw 1	kW	3.3	3.3	3.3	**3.3**
Fuel Feed Left Metering Screw 2	kW	3.5	3.7	3.3	**3.5**
Fuel Feed Right Metering Screw 2	kW	4.1	3.7	4.0	**4.0**
Fuel Feed Left Metering Screw 3	kW	4.0	3.9	4.1	**4.0**
Fuel Feed Right Metering Screw 3	kW	3.9	3.7	4.0	**3.8**
Fuel Silo 1 Reclaimer	kW	24.0	24.1	23.8	**24.0**
Fuel Silo 2 Reclaimer	kW	25.9	25.4	27.3	**26.2**
Fuel Feed Left Rotary Feeder 1	kW	5.3	5.3	5.3	**5.3**
Fuel Feed Left Rotary Feeder 2	kW	5.3	5.3	5.3	**5.3**
Fuel Feed Left Rotary Feeder 3	kW	5.5	5.5	5.5	**5.5**
Fuel Feed Right Rotary Feeder 1	kW	5.3	5.3	5.3	**5.3**
Fuel Feed Right Rotary Feeder 2	kW	5.4	5.4	5.4	**5.4**
Fuel Feed Right Rotary Feeder 3	kW	5.3	5.3	5.3	**5.3**
Fuel Silo 1 Lube Unit	kW	0.1	0.1	0.1	**0.1**
Fuel Silo 2 Lube Unit	kW	0.1	0.1	0.1	**0.1**
Fuel Silo 1 Rotating Spreader	kW	0.9	0.9	0.9	**0.9**
Fuel Silo 2 Rotating Spreader	kW	1.0	1.0	1.0	**1.0**
Fuel Silo 1 Turn Device	kW	1.0	1.0	1.2	**1.1**
Fuel Silo 1 Turn Device	kW	1.0	1.1	1.1	**1.1**
Fuel Silo 2 Turn Device	kW	1.1	1.1	0.9	**1.0**
Fuel Silo 2 Turn Device	kW	1.1	0.9	1.0	**1.0**
Baghouse Air Dryer 1	kW	0.1	0.1	0.1	**0.1**
Baghouse Air Dryer 2	kW	0.2	0.2	0.2	**0.2**
Baghouse Air Compressor 1	kW	21.5	21.5	21.5	**21.5**
Baghouse Air Compressor 2	kW	21.5	21.5	21.5	**21.5**
Sodium Bicarbonate Air Blower 1	kW	6.5	6.5	6.5	**6.5**
Sodium Bicarbonate Rotary Airlock 1	kW	0.1	0.1	0.1	**0.1**
Dust Collector #2 Fan	kW	8.0	8.0	8.0	**8.0**
Dust Collector #2	kW	0.6	0.6	0.6	**0.6**
Dust Collector #3 Fan	kW	3.2	3.2	3.2	**3.2**
Conveyor #10 Drive #1	kW	6.8	6.8	6.8	**6.8**
Conveyor #9 Drive #1	kW	31.9	31.9	31.9	**31.9**
Total Yard Load	kW	200.4	199.6	201.5	**200.5**

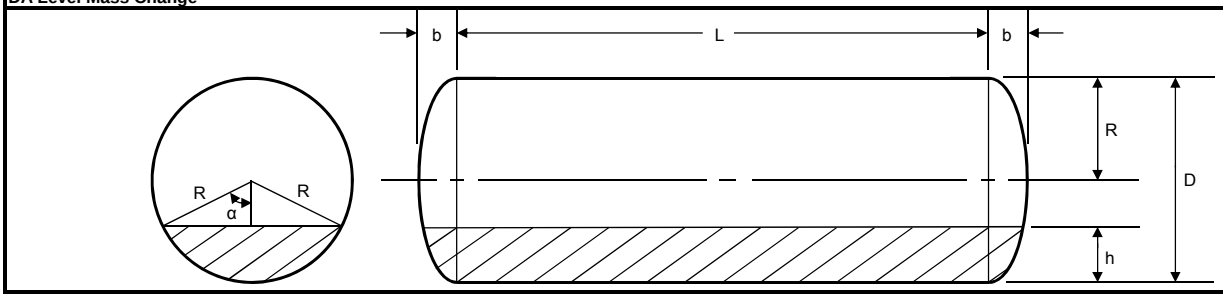
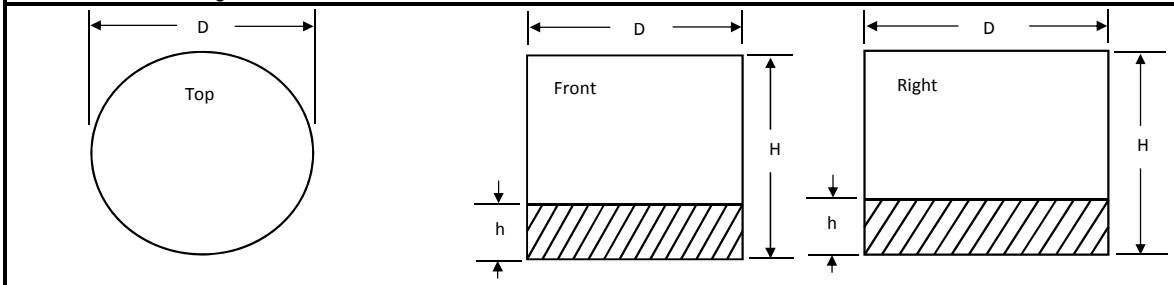
CALCULATIONS AND CONVERSIONS

DESCRIPTION	Units	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Steam Flow Inputs						
Enthalpy Reference Temperature	Deg F	**77.0**	**77.0**	**77.0**	**77.0**	**77.0**
Air Properties						
Primary Air Flow	lb/hr	281,100	284,643	287,139	285,389	**285,724**
Primary Air Inlet Temperature	Deg F	80.0	97.7	98.9	91.8	**96.1**
Primary Air Outlet Temperature	Deg F	107.0	108.4	107.5	106.4	**107.4**
Secondary Air Flow	lb/hr	801,600	557,136	558,141	552,401	**555,893**
Secondary Air Inlet Temperature	Deg F	80.0	66.3	68.5	60.9	**65.2**
Secondary Air Outlet Temperature	Deg F	152.0	155.1	154.9	155.0	**155.0**
Barometric Pressure	psia	14.58	14.74	14.73	14.74	**14.74**
Absolute Humidity at Fan Inlet	lbH2O/lb Dry Air	0.021	0.015	0.016	0.013	**0.015**
Primary Air Pressure	psia	15.0	15.0	15.0	15.0	**15.0**
Secondary Air Pressure	psia	15.0	15.0	15.0	15.0	**15.0**
Steam Properties						
SCAH Steam Pressure	psia	44.7	44.4	44.5	44.1	**44.3**
SCAH Steam Inlet Quality	%	0.992	0.992	0.992	0.992	**0.992**
Cooling Water Properties						
Bottom Ash Specific Heat	BTU/lb -F	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**
Bottom Ash Flow	lb/hr	1,529	1,789	1,760	1,729	**1,759**
Bottom Ash Cooling Water Pressure	psia	50.0	62.9	62.8	62.9	**62.9**
Bottom Ash Cooling Water Inlet Temperature	Deg F	86.0	88.6	92.1	89.9	**90.2**
Bottom Ash Cooling Water Outlet Temperature	Deg F	101.0	111.6	112.3	110.9	**111.6**
Bottom Ash Cooling Water Flow	gpm	0.0	135.4	139.7	139.5	**138.2**
Calculations						
Primary Air Inlet Enthalpy	BTU/lb	41.76	39.66	41.17	36.82	**39.21**
Primary Air Exit Enthalpy	BTU/lb	48.49	42.29	43.28	40.43	**42.00**
Secondary Air Inlet Enthalpy	BTU/lb	19.74	16.16	16.73	14.81	**15.90**
Secondary Air Exit Enthalpy	BTU/lb	40.37	40.22	40.40	39.94	**40.19**
SCAH Steam Inlet Enthalpy	BTU/lb	1,164.64	1,164.49	1,164.54	1,164.38	**1,164.47**
SCAH Condensate Exit Enthalpy	BTU/lb	243.09	242.64	242.77	242.26	**242.56**
SCAH Steam Flow	lb/hr	19,997	15,358	14,996	16,171	**15,508**
Bottom Ash Coolnig Water Density	lb/cu.ft.	61.99	61.85	61.84	61.86	**61.85**
Bottom Ash Cooling Water Mass Flow	lb/hr	0	67,175	69,305	69,227	**68,569**
Bottom Ash Cooling Water Inlet Enthalpy	BTU/lb	54.19	56.87	60.31	58.12	**58.43**
Bottom Ash Cooling Water Outlet Enthalpy	BTU/lb	69.16	79.79	80.51	79.08	**79.79**

STORAGE CONTAINER LEVEL CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Hotwell Level Mass Change							
							
Inputs							
Length	ft	L	**22.08**	22.08	22.08	22.08	**22.08**
Width	ft	W	**11.00**	11.00	11.00	11.00	**11.00**
Pressure	psia	P	**1.18**	**1.04**	**1.07**	**1.01**	**1.04**
Temperature	Deg F	T	**107.29**	**103.15**	**104.12**	**102.06**	**103.11**
Start Level	in	h_i	**48.00**	**-4.42**	**-4.45**	**-3.81**	**-4.23**
Stop Level	in	h_f	**48.00**	**-4.43**	**-3.77**	**-3.32**	**-3.84**
Start Time	hr:min:sec	$Time_i$	**14:00:00**	10:00:00	14:00:00	18:00:00	**14:00:00**
Stop Time	hr:min:sec	$Time_f$	**15:00:00**	14:00:00	18:00:00	22:00:00	**18:00:00**
Adjustment	ft^3		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Calculations							
Level Change	in	Dh	0.00	-0.01	0.68	0.49	**0.39**
Elapsed Time	hrs	DTime	1.00	4.00	4.00	4.00	**4.00**
Level Rate	in/hr	Dh/DTime	0.00	0.00	0.17	0.12	**0.10**
Sensitivity	ft3/in	V/Dh	20.24	20.24	20.24	20.24	**20.24**
Volume Change	ft3/hr	DV	0.00	-0.07	3.44	2.49	**1.95**
Density	lbm/ft3	r	61.90	61.95	61.94	61.97	**61.95**
Mass Change (Neg Value is Mass Loss)	lbm/hr	m	**0.00**	**-4.41**	**213.16**	**154.24**	**121.00**
Drum Level Mass Change							
							
Inputs							
Length (L) [Note: Total Length of Tank, Cap to Cap Centerline]	ft	L	**39.91**	**39.91**	**39.91**	**39.91**	**39.91**
Radius (R) [Note: Radius of Cylindrical Tank Section]	ft	R	**2.62**	**2.62**	**2.62**	**2.62**	**2.62**
Radius of Sphere (b) [Note: Depth of End Cap Sherical Section]	ft	b	**0.93**	**0.93**	**0.93**	**0.93**	**0.93**
Pressure	Psia	P	**1799.15**	**1749.68**	**1750.63**	**1749.30**	**1749.87**
Temperature	Deg F	T	**620.01**	**616.15**	**616.22**	**616.12**	**616.16**
Start Level (H) [Note: From Tank Bottom]	in	h_i	**10.00**	**31.26**	**31.37**	**31.48**	**31.37**
Stop Level (H) [Note: From Tank Bottom]	in	h_f	**10.00**	**31.32**	**31.58**	**31.34**	**31.41**
Start Time	hr:min:sec	$Time_i$	**14:00:00**	10:00:00	14:00:00	18:00:00	**14:00:00**
Stop Time	hr:min:sec	$Time_f$	**15:00:00**	14:00:00	18:00:00	22:00:00	**18:00:00**
Adjustment	ft^3		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Calculations							
Start Level (Neg Value is Above Center)	ft	$R-h_i$	1.791	0.019	0.011	0.001	**0.01**
Stop Level (Neg Value is Above Center)	ft	$R-h_f$	1.791	0.015	-0.007	0.013	**0.01**
Level Change	in	Dh	0.00	-0.06	-0.21	0.14	**-0.04**
Elapsed Time	hrs	DTime	1.00	4.00	4.00	4.00	**4.00**
Start Volume	ft^3	V_i	85.92	421.20	423.03	425.00	**423.08**
Stop Volume	ft^3	V_f	85.92	422.20	426.62	422.50	**423.77**
Volume Change (Neg Value is Decrease in Volume)	ft^3	DV	0.00	1.00	3.59	-2.50	**0.70**
Volume Change Rate	ft^3/hr	DV/DTime	0.00	0.25	0.90	-0.63	**0.17**
Density	lbm/ft^3	r	40.59	40.95	40.94	40.95	**40.94**
Mass Change (Neg Value is Mass Loss)	lbm/hr	m	**0.00**	**10.23**	**36.75**	**-25.59**	**7.13**

STORAGE CONTAINER LEVEL CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
DA Level Mass Change							
							
Inputs							
Length (L) [Note: Total Length of Tank, Cap to Cap Centerline]	ft	L	**63.00**	**63.00**	**63.00**	**63.00**	**63.00**
Radius (R) [Note: Radius of Cylindrical Tank Section]	ft	R	**6.25**	**6.25**	**6.25**	**6.25**	**6.25**
Radius of Sphere (b) [Note: Depth of End Cap Sherical Section]	ft	b	**3.13**	**3.13**	**3.13**	**3.13**	**3.13**
Temperature	Deg F	T	**272.00**	**274.44**	**274.58**	**274.02**	**274.35**
Start Level (H) [Note: From Tank Bottom]	%	h_i	**50.00**	**55.14**	**54.96**	**54.92**	**55.01**
Stop Level (H) [Note: From Tank Bottom]	%	h_f	**50.00**	**54.94**	**54.93**	**54.95**	**54.94**
Start Time	hr:min:sec	$Time_i$	**14:00:00**	10:00:00	14:00:00	18:00:00	**14:00:00**
Stop Time	hr:min:sec	$Time_f$	**15:00:00**	14:00:00	18:00:00	22:00:00	**18:00:00**
Adjustment	ft^3		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Calculations							
Pressure	Psia	P	43.27	45.02	45.12	44.71	**44.95**
Start Level (H) [Note: From Tank Bottom]	ft	h_i	6.25	6.89	6.87	6.87	**6.88**
Stop Level (H) [Note: From Tank Bottom]	ft	h_f	6.25	6.87	6.87	6.87	**6.87**
Start Level (Neg Value is Above Center)	ft	$R-h_i$	0.000	-0.642	-0.619	-0.616	**-0.63**
Stop Level (Neg Value is Above Center)	ft	$R-h_f$	0.000	-0.617	-0.616	-0.619	**-0.62**
Level Change	in	Dh	0.00	0.30	0.04	-0.04	**0.10**
Elapsed Time	hrs	DTime	1.00	4.00	4.00	4.00	**4.00**
Start Volume	ft^3	V_i	2,164.68	2,478.28	2,467.06	2,465.16	**2,470.17**
Stop Volume	ft^3	V_f	2,164.68	2,466.09	2,465.26	2,466.67	**2,466.01**
Volume Change (Neg Value is Decrease in Volume)	ft^3	DV	0.00	-12.19	-1.80	1.51	**-4.16**
Volume Change Rate	ft^3/hr	DV/DTime	0.00	-3.05	-0.45	0.38	**-1.04**
Density	lbm/ft^3	r	58.18	58.11	58.10	58.12	**58.11**
Mass Change (Neg Value is Mass Loss)	lbm/hr	m	**0.00**	**-177.12**	**-26.08**	**21.88**	**-60.44**
DI Tank Level Mass Change							
							
Inputs							
Diameter	ft	D	**24.00**	**24.00**	**24.00**	**24.00**	**24.00**
Pressure	psia	P	**14.58**	**14.74**	**14.73**	**14.74**	**14.74**
Temperature	Deg F	T	**60.00**	**75.52**	**75.59**	**75.44**	**75.51**
Start Level	ft	h_i	**60.00**	**27.02**	**26.13**	**25.13**	**26.09**
Stop Level	ft	h_f	**60.00**	**26.13**	**25.13**	**24.11**	**25.13**
Start Time	hr:min:sec	$Time_i$	**14:00:00**	10:00:00	14:00:00	18:00:00	**14:00:00**
Stop Time	hr:min:sec	$Time_f$	**15:00:00**	14:00:00	18:00:00	22:00:00	**18:00:00**
Adjustment	ft^3		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Calculations							
Level Change	in	Dh	0.00	-10.64	-11.91	-12.21	**-11.59**
Elapsed Time	hrs	DTime	1.00	4.00	4.00	4.00	**4.00**
Level Rate	in/hr	Dh/DTime	0.00	-2.66	-2.98	-3.05	**-2.90**
Sensitivity	ft3/in	V/Dh	37.70	37.70	37.70	37.70	**37.70**
Volume Change	ft3/hr	DV/DTime	0.00	-100.27	-112.27	-115.05	**-109.20**
Density	lbm/ft3	r	62.37	62.26	62.26	62.26	**62.26**
Mass Change (Neg Value is Mass Loss)	lbm/hr	m	**0**	**-6,243**	**-6,990**	**-7,163**	**-6,798**

NOZZLE FLOW RATE

DESCRIPTION	Units	Symbol	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00
Calculation Inputs						
Flow Element						
Meter Type			**NOZZLE**	**NOZZLE**	**NOZZLE**	**NOZZLE**
Pipe Material			**CS**	**CS**	**CS**	**CS**
Throat Material			**SS3**	**SS3**	**SS3**	**SS3**
Pipe Diameter	Inches		10.1260	10.1260	10.1260	10.1260
Throat Diameter	Inches		6.2400	6.2400	6.2400	6.2400
Flowing Temperature	Deg F		439.0000	439.2366	439.3112	438.9714
Flowing Pressure	Psia		1,875.1500	2,352.4866	2,351.1361	2,358.5986
Differential Pressure Tap 1	In. H2O		68.9273	64.2246	64.2769	63.6157
Average Cx from Nozzle Calibration Tap 1			**1.0000**	**1.0000**	**1.0000**	**1.0000**
Frequency	Pulse		**0.00**	**0.00**	**0.00**	**0.00**
Fluid Type			**WATER**	**WATER**	**WATER**	**WATER**
Discharge Coefficient - PTC 19.5	-	Tap 1	0.9925	0.9925	0.9925	0.9925
Viscosity	lbm / ft-sec		8.079E-05	8.129E-05	8.127E-05	8.135E-05
Fluid Density - 1997 Steam Tables	lb / ft ^3		52.5359	52.6997	52.6960	52.7135
Reynolds Number, Re_D Tap 1	-		4,704,300	4,519,690	4,522,307	4,495,382
Gas Expansion Factor, Y1	-		1.00000	1.00000	1.00000	1.00000
Beta @ Flowing Conditions	-		0.61686	0.61686	0.61686	0.61686
Intermediate Calculations - Calculated Discharge Coefficients						
Discharge Coefficient - PTC 19.5 Tap 1	-		0.9925	0.9925	0.9925	0.9925
Outputs						
Flow Rate - H20 Flow Function	lb/hr	Tap 1	**909,209**	878,987	879,316	874,914
Average Flow Rate for Used Taps - H2O Flow			**909,209**	**878,987**	**879,316**	**874,914**
Flow Rate - Manual Flow Function	lb/hr	Tap 1	**909,053**	878,824	879,152	874,752
Average Flow Rate for Used Taps - H2O Flow			**909,053**	**878,824**	**879,152**	**874,752**

STEAM CALCULATIONS

DESCRIPTION	Units	Symbol	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
BOILER CALCULATION INPUTS							
Feedwater Flow Rate	lbm/hr	m_F	**909,209.00**	878,823.87	879,152.48	874,751.90	**877,576.08**
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	lbm/hr	m_{BD}	**5,127.00**	0.00	0.00	0.00	**0.00**
Bottom Ash Cooling Water Flow Rate	gpm	m_{BACW}	**0.00**	67,174.94	69,304.72	69,226.54	**68,568.73**
SCAH Steam Flow Rate	lbm/hr	m_{SCAH}	**14,020.00**	14,996.17	16,170.74	15,508.29	**15,558.40**
Drum Flow as a Result of Level Change	lbm/hr	m_{DRUM}	**0.00**	10.23	36.75	-25.59	**7.13**
Main Steam Flow	lbm/hr	m_S	**904,082.00**	878,834.11	879,189.22	874,726.31	**877,583.21**
Economizer Feedwater Inlet Pressure	psia	P_F	**1,875.15**	2,352.49	2,351.14	2,358.60	**2,354.07**
Economizer Feedwater Inlet Temperature	Deg F	T_F	**439.00**	439.24	439.31	438.97	**439.17**
Boiler Drum Pressure	psia	P_D	**1,799.15**	1,749.68	1,750.63	1,749.30	**1,749.87**
Boiler Continuous Blowdown Flash Tank Pressure	psia	P_{CBD}	**44.71**	44.39	44.48	44.13	**44.33**
Boiler HP Steam Outlet Pressure	psia	P_{HP}	**1,634.00**	1,619.20	1,619.54	1,618.73	**1,619.16**
Boiler HP Steam Outlet Temperature	Deg F	T_{HP}	**1,005.00**	998.45	998.72	998.80	**998.65**
Bottom Ash Cooling Water Inlet Pressure	psia	P_{BACWI}	**50.00**	62.93	62.81	62.94	**62.89**
Bottom Ash Cooling Water Inlet Temperature	Deg F	T_{BACWI}	**86.00**	88.65	92.09	89.90	**90.21**
Bottom Ash Cooling Water Outlet Pressure	psia	P_{BACWO}	**50.00**	62.93	62.81	62.94	**62.89**
Bottom Ash Cooling Water Outlet Temperature	Deg F	T_{BACWO}	**101.00**	111.62	112.33	110.90	**111.62**
SCAH Steam Pressure	psia	P_{SCAHI}	**44.71**	44.39	44.48	44.13	**44.33**
SCAH Steam Temperature	Deg F	T_{SCAHI}	**272.00**	274.44	274.58	274.02	**274.35**
SCAH Steam Quality	%	Q_{SCAHI}	**0.99**	0.99	0.99	0.99	**0.99**
SCAH Drain Pressure (Forwarding Pump Inlet)	psia	P_{SCAHO}	**44.71**	44.39	44.48	44.13	**44.33**
BOILER INTERMEDIATE CALCULATIONS							
Feedwater Economizer Enthalpy	BTU/hr	h_F	**419.01**	419.68	419.76	419.40	**419.61**
Boiler Drum Sat. Lq. Enthalpy	BTU/hr	h_D	**648.17**	642.26	642.38	642.22	**642.28**
Boiler CBD Flash Tank Sat. Stm. Enthalpy	BTU/hr	h_{CBDS}	**1,172.03**	1,171.89	1,171.93	1,171.77	**1,171.86**
Boiler CBD Flash Tank Sat. Lq. Enthalpy	BTU/hr	h_{CBDL}	**243.09**	242.64	242.77	242.26	**242.56**
Boiler HP Steam Outlet Enthalpy	BTU/hr	h_{HP}	**1,489.68**	1,486.13	1,486.29	1,486.36	**1,486.26**
Boiler CBD Flow Rate	lbm/hr	m_{CBD}	**9,091.48**	0.00	0.00	0.00	**0.00**
Boiler Steam Energy Absorbed	mmBTU/hr	q_{BLR}	**965.81**	937.24	937.69	933.29	**936.07**
Bottom Ash Cooling Water Inlet Enthalpy	BTU/lbm	h_{BACWI}	**54.19**	56.87	60.31	58.12	**58.43**
Bottom Ash Cooling Water Outlet Enthalpy	BTU/lbm	h_{BACWO}	**69.16**	79.79	80.51	79.08	**79.79**
Bottom Ash Cooling Water Energy Absorbed	mmBTU/hr	q_{BACW}	**0.00**	-1.54	-1.40	-1.45	**-1.46**
SCAH Steam Enthalpy	BTU/hr	h_{SCAHI}	**1,164.64**	1,164.49	1,164.54	1,164.38	**1,164.47**
SCAH Drain Enthalpy	BTU/hr	h_{SCAHO}	**220.68**	242.64	242.77	242.26	**242.56**
SCAH Energy Absorbed	mmBTU/hr	q_{SCAH}	**-13.23**	-13.82	-14.91	-14.30	**-14.34**
BOILER CALCULATED RESULTS							
Boiler Output Energy (Steam Energy + Bottom Ash Cooling)	mmBTU/hr	QrO11	**965.81**	937.24	937.69	933.29	**936.07**
Corrected Main Steam Flow	**lb/hr**	$\mathbf{m_{Fcorr}}$	**900,117.52**	**870,045.76**	**870,397.33**	**865,979.04**	**868,807.38**
Corrected Boiler Output Energy	mmBTU/hr	$Qr1_{corr}$	**952.27**	929.82	930.27	925.90	**928.67**

COMBUSTION CALCULATIONS

DESCRIPTION	UNITS	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
CALCULATION INPUTS						
Fuel Data						
Higher Heating Value of Fuel	BTU/lbm	4,768.40	5,178.09	5,212.47	5,160.90	**5,183.82**
Unburned Carbon	lbm/100 lbm fuel	0.12	0.22	0.18	0.14	**0.18**
Fuel Flow	Klbm/hr	264.33	225.87	223.76	226.18	**225.27**
Measured Fuel Flow	Klbm/hr	0.00	0.00	0.00	0.00	**0.00**
Calculated Fuel Flow	Klbm/hr	264.34	225.87	223.76	226.18	**225.27**
Output	mmBTU/hr	965.81	937.24	937.69	933.29	**936.07**
Fuel Efficiency	%	76.62	80.14	80.39	79.95	**80.16**
Ambient Data						
Moisture in Air	lbm/lbm Dry Air	0.0205	0.0146	0.0157	0.0134	**0.0146**
Barometeric Pressure	psia	14.58	14.74	14.73	14.74	**14.74**
Ambient Dry Bulb Temperature	Deg F	80.00	74.66	75.32	70.07	**73.35**
Ambient Wet Bulb Temperature	Deg F	78.00	69.93	71.49	66.88	**69.43**
Relative Humidity	%	91.60	79.40	83.28	85.03	**82.57**
Additional Moisture (Measured)						
Atomizing Steam	Klbm/hr	0.00	0.00	0.00	0.00	**0.00**
Sootblowing Steam	Klbm/hr	0.00	0.00	0.00	0.00	**0.00**
Moisture in Flue Gas Recirculation	Klbm/hr	37.83	29.53	29.10	28.87	**29.17**
NH3 Moisture	Klbm/hr	0.40	0.16	0.16	0.16	**0.16**
Summation Additional Moisture	Klbm/hr	38.23	29.69	29.26	29.03	**29.33**
Additional Moisture	lbm/100 lbm fuel	14.46	13.15	13.08	12.84	**13.02**
Additional Moisture	lbm/10KBTU	0.30	0.25	0.25	0.25	**0.25**
Air Heater Data						
Gas Temperature Leaving Primary Air Heater	Deg F	316.00	307.92	308.96	309.71	**308.86**
Gas Temperature Leaving Secondary Air Heater	Deg F	316.00	307.92	308.96	309.71	**308.86**
Air Temperature Entering Primary Air Heater	Deg F	107.00	108.40	107.50	106.41	**107.44**
Air Temperature Entering Secondary Air Heater	Deg F	152.00	155.07	154.95	154.96	**154.99**
O2 Entering Primary Air Heater	%	2.88	2.88	2.86	2.86	**2.87**
O2 Entering Secondary Air Heater	%	2.88	2.88	2.86	2.86	**2.87**
O2 Leaving Primary Air Heater	%	3.76	3.95	3.91	3.91	**3.92**
O2 Leaving Secondary Air Heater	%	3.76	3.95	3.91	3.91	**3.92**
Primary Air to Gas / Secondary Air to Gas Leakage Split	PA% / SA%	0 / 100	0 / 100	0 / 100	0 / 100	
Primary AH Leakage for Trisector Type AH	%	0.00%	0.00%	0.00%	0.00%	**0.00%**
Sorbent Data (Enter 0 if Sorbent not Used)						
Sorbent Rate	Klbm/hr	28.41	28.41	28.41	28.41	**28.41**
CO2 from Sorbent	lbm/100 lbm Sorbent	0.00	0.00	0.00	0.00	**0.00**
H2O from Sorbent	lbm/100 lbm Sorbent	0.00	0.00	0.00	0.00	**0.00**
Sulfur Capture	lbm/lbm Sulfur	0.00	0.00	0.00	0.00	**0.00**
Spent Sorbent	lbm/lbm Fuel	10.75	12.58	12.70	12.56	**12.61**
Sorbent/Fuel Ratio	lbm Sor/ lbm fuel	0.11	0.13	0.13	0.13	**0.13**
Ultimate Analysis (% Mass)						
Carbon, C	% Mass	27.50	30.39	30.67	30.84	**30.63**
Unburned Carbon, UBC	% Mass	0.12	0.22	0.18	0.14	**0.18**
Burned Carbon, Cb	% Mass	27.38	30.17	30.49	30.70	**30.45**
Sulfur, S	% Mass	0.01	0.01	0.01	0.01	**0.01**
Hydrogen, H2	% Mass	3.37	3.53	3.53	3.62	**3.56**
Moisture, H2O	% Mass	45.00	37.62	37.27	37.83	**37.57**
Moisture, H2O vapor	% Mass	0.00	0.00	0.00	0.00	**0.00**
Nitrogen, N2	% Mass	0.06	0.24	0.23	0.23	**0.23**
Oxygen, O2	% Mass	23.39	25.17	25.44	24.88	**25.16**
Ash	% Mass	0.71	3.04	2.85	2.59	**2.83**
Volatile Material, VM	% Mass	0.00	0.00	0.00	0.00	**0.00**
Fixed Carbon, FC	% Mass	0.00	0.00	0.00	0.00	**0.00**
Total	% Mass	**100.04**	**100.00**	**100.00**	**100.00**	**100.00**
COMBUSTION CALCULATIONS						
Mass of Ash	lbm/10KBTU	0.01	0.06	0.05	0.05	**0.05**
Theoretical Air Fired (lbm/100lbm Fuel)						
Burned Carbon, Cb	lbm/100lbm Fuel	315.20	347.21	350.89	353.41	**350.50**
Sulfur, S	lbm/100lbm Fuel	0.04	0.04	0.04	0.04	**0.04**
Hydrogen, H2	lbm/100lbm Fuel	115.42	121.04	121.04	124.13	**122.07**
Oxygen, O2	lbm/100lbm Fuel	-101.05	-108.73	-109.90	-107.48	**-108.71**
Total	**lbm/100lbm Fuel**	329.61	359.56	362.07	370.10	**363.91**
Dry Products Fired (mol/100lbm Fuel)						
Burned Carbon, Cb	mol/100lbm Fuel	2.28	2.51	2.54	2.56	**2.54**
Sulfur, S	mol/100lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Nitrogen, N2	mol/100lbm Fuel	0.00	0.01	0.01	0.01	**0.01**
Total	mol/100lbm Fuel	**2.28**	**2.52**	**2.55**	**2.56**	**2.54**
Wet Products Fired (mol/100lbm Fuel)						
Hydrogen, H2	mol/100lbm Fuel	1.67	1.75	1.75	1.80	**1.77**
Moisture, H2O	mol/100lbm Fuel	2.50	2.09	2.07	2.10	**2.09**
Moisture, H2O vapor	mol/100lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Total	mol/100lbm Fuel	**4.17**	**3.84**	**3.82**	**3.90**	**3.85**
H2O Fuel (lbm/10KBTU)						
Hydrogen, H2	lbm/10KBTU	0.63	0.61	0.61	0.63	**0.61**
Moisture, H2O	lbm/10KBTU	0.94	0.73	0.72	0.73	**0.72**

COMBUSTION CALCULATIONS

DESCRIPTION	UNITS	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Moisture, H2O vapor	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Total	lbm/10KBTU	**1.57**	**1.34**	**1.32**	**1.36**	**1.34**
Total Theoretical Air Fuel Check	lbm/10KBTU	6.94	6.99	6.99	7.20	**7.06**
Products Combusted						
CO2 from Sorbent	lbm/100lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
H2O from Sorbent	lbm/100lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
SO2 Reduction	mol/100lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Dry Products Combusted	mol/100lbm Fuel	2.28	2.52	2.55	2.56	**2.54**
Wet Products Combusted	mol/100lbm Fuel	6.45	6.36	6.37	6.46	**6.40**
Theoretical Air Correction	lbm/100lbm Fuel	329.61	359.56	362.07	370.10	**363.91**
Theoretical Air Correction	mol/100lbm Fuel	11.38	12.41	12.50	12.78	**12.56**
Theoretical Air Correction	lbm/10KBTU	6.91	6.94	6.95	7.17	**7.02**
Wet Gas from Fuel	lbm/10KBTU	2.08	1.87	1.86	1.88	**1.87**
CALCULATION INPUTS						
Economizer			**2.40**			**2.40**
Flue Gas Temperature Leaving Economizer	Deg F	**498.00**	**491.91**	**493.37**	**493.76**	**493.02**
Flue Gas Oxygen Content Leaving Economizer	%	**2.88**	**2.88**	**2.86**	**2.86**	**2.87**
Air Heater Data						
Primary Air Inlet						
Flue Gas Temperature Entering Air Heater	Deg F	**498.00**	**491.91**	**493.37**	**493.76**	**493.02**
Air Temperature Entering Air Heater	Deg F	**107.00**	**108.40**	**107.50**	**106.41**	**107.44**
Flue Gas Oxygen Content Primary Air Inlet	%	**2.88**	**2.88**	**2.86**	**2.86**	**2.87**
Primary Air Outlet						
Flue Gas Temperature Entering Air Heater	Deg F	**316.00**	**307.92**	**308.96**	**309.71**	**308.86**
Air Temperature Leaving Air Heater	Deg F	**472.00**	**441.55**	**442.58**	**442.31**	**442.15**
Flue Gas Oxygen Content Primary Air Inlet	%	**3.76**	**3.95**	**3.91**	**3.91**	**3.92**
Secondary Air Inlet						
Flue Gas Temperature Entering Air Heater	Deg F	**498.00**	**491.91**	**493.37**	**493.76**	**493.02**
Air Temperature Entering Air Heater	Deg F	**152.00**	**155.07**	**154.95**	**154.96**	**154.99**
Flue Gas Oxygen Content Primary Air Inlet	%	**2.88**	**2.88**	**2.86**	**2.86**	**2.87**
Secondary Air Outlet						
Flue Gas Temperature Entering Air Heater	Deg F	**316.00**	**307.92**	**308.96**	**309.71**	**308.86**
Air Temperature Leaving Air Heater	Deg F	**447.00**	**424.46**	**426.39**	**426.71**	**425.85**
Flue Gas Oxygen Content Primary Air Inlet	%	**3.76**	**3.95**	**3.91**	**3.91**	**3.92**
ENERGY AND AIR CALCULATIONS						
Flue Gas Analysis						
Economizer						
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.28**	**2.52**	**2.55**	**2.56**	**2.54**
Additional Moisture	mol/100 lbm Fuel	0.80	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.00	9.81	9.88	10.10	**9.93**
Summation	mol/100 lbm Fuel	12.08	13.06	13.15	13.38	**13.20**
	mol/100 lbm Fuel	18.07	18.07	18.09	18.09	**18.08**
Excess Air	%	16.92	16.77	16.62	16.58	**16.66**
Primary Air Inlet						
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.28**	**2.52**	**2.55**	**2.56**	**2.54**
Additional Moisture	mol/100 lbm Fuel	0.80	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.00	9.81	9.88	10.10	**9.93**
Summation	mol/100 lbm Fuel	12.08	13.06	13.15	13.38	**13.20**
	mol/100 lbm Fuel	18.07	18.07	18.09	18.09	**18.08**
Excess Air	%	16.92	16.77	16.62	16.58	**16.66**
Primary Air Outlet						
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.28**	**2.52**	**2.55**	**2.56**	**2.54**
Additional Moisture	mol/100 lbm Fuel	0.80	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.00	9.81	9.88	10.10	**9.93**
Summation	mol/100 lbm Fuel	12.08	13.06	13.15	13.38	**13.20**
	mol/100 lbm Fuel	17.19	17.00	17.04	17.04	**17.03**
Excess Air	%	23.22	24.46	24.15	24.02	**24.21**
Secondary Air Inlet						
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.28**	**2.52**	**2.55**	**2.56**	**2.54**
Additional Moisture	mol/100 lbm Fuel	0.80	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.00	9.81	9.88	10.10	**9.93**
Summation	mol/100 lbm Fuel	12.08	13.06	13.15	13.38	**13.20**
	mol/100 lbm Fuel	18.07	18.07	18.09	18.09	**18.08**
Excess Air	%	16.92	16.77	16.62	16.58	**16.66**
Secondary Air Outlet						
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.28**	**2.52**	**2.55**	**2.56**	**2.54**

COMBUSTION CALCULATIONS

DESCRIPTION	UNITS	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Additional Moisture	mol/100 lbm Fuel	0.80	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.00	9.81	9.88	10.10	**9.93**
Summation	mol/100 lbm Fuel	12.08	13.06	13.15	13.38	**13.20**
	mol/100 lbm Fuel	17.19	17.00	17.04	17.04	**17.03**
Excess Air	%	23.22	24.46	24.15	24.02	**24.21**
O2, CO2, SO2 when Excess Air is Known						
Primary Air Inlet						
Dry Air	mol/100 lbm Fuel	10.92	11.89	11.96	12.22	**12.02**
Wet Air	mol/100 lbm Fuel	10.92	11.89	11.96	12.22	**12.02**
Dry Gas	mol/100 lbm Fuel	13.20	14.41	14.51	14.78	**14.57**
Wet Gas	mol/100 lbm Fuel	17.37	18.25	18.33	18.68	**18.42**
O2	%	3.06	3.03	3.00	3.00	**3.01**
CO2	%	17.27	17.42	17.50	17.29	**17.41**
SO2	%	0.00	0.00	0.00	0.00	**0.00**
Primary Air Outlet						
Dry Air	mol/100 lbm Fuel	11.64	12.85	12.90	13.17	**12.97**
Wet Air	mol/100 lbm Fuel	11.64	12.85	12.90	13.17	**12.97**
Dry Gas	mol/100 lbm Fuel	13.92	15.37	15.45	15.74	**15.52**
Wet Gas	mol/100 lbm Fuel	18.09	19.21	19.27	19.63	**19.37**
O2	%	3.98	4.14	4.09	4.09	**4.11**
CO2	%	16.38	16.34	16.43	16.25	**16.34**
SO2	%	0.00	0.00	0.00	0.00	**0.00**
Secondary Air Inlet						
Dry Air	mol/100 lbm Fuel	10.92	11.89	11.96	12.22	**12.02**
Wet Air	mol/100 lbm Fuel	10.92	11.89	11.96	12.22	**12.02**
Dry Gas	mol/100 lbm Fuel	13.20	14.41	14.51	14.78	**14.57**
Wet Gas	mol/100 lbm Fuel	17.37	18.25	18.33	18.68	**18.42**
O2	%	3.06	3.03	3.00	3.00	**3.01**
CO2	%	17.27	17.42	17.50	17.29	**17.41**
SO2	%	0.00	0.00	0.00	0.00	**0.00**
Secondary Air Outlet						
Dry Air	mol/100 lbm Fuel	11.64	12.85	12.90	13.17	**12.97**
Wet Air	mol/100 lbm Fuel	11.64	12.85	12.90	13.17	**12.97**
Dry Gas	mol/100 lbm Fuel	13.92	15.37	15.45	15.74	**15.52**
Wet Gas	mol/100 lbm Fuel	18.09	19.21	19.27	19.63	**19.37**
O2	%	3.98	4.14	4.09	4.09	**4.11**
CO2	%	16.38	16.34	16.43	16.25	**16.34**
SO2	%	0.00	0.00	0.00	0.00	**0.00**
Flue Gas Products						
Economizer						
Dry Air	lbm/10KBTU	8.08	8.11	8.10	8.36	**8.19**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**1.87**	**1.86**	**1.88**	**1.87**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.17	0.12	0.13	0.11	**0.12**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.30**	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	10.63	10.35	10.34	10.61	**10.43**
H2O in Wet Gas	lbm/10KBTU	2.04	1.71	1.70	1.72	**1.71**
Dry Gas	lbm/10KBTU	8.59	8.64	8.64	8.89	**8.72**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	19.23	16.51	16.43	16.22	**16.39**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.24	0.31	0.30	0.30	**0.30**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.03	0.03	0.02	**0.03**
Primary Air Inlet						
Dry Air	lbm/10KBTU	8.08	8.11	8.10	8.36	**8.19**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**1.87**	**1.86**	**1.88**	**1.87**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.17	0.12	0.13	0.11	**0.12**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.30**	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	10.63	10.35	10.34	10.61	**10.43**
H2O in Wet Gas	lbm/10KBTU	2.04	1.71	1.70	1.72	**1.71**
Dry Gas	lbm/10KBTU	8.59	8.64	8.64	8.89	**8.72**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	19.23	16.51	16.43	16.22	**16.39**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.24	0.31	0.30	0.30	**0.30**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.03	0.03	0.02	**0.03**
Primary Air Outlet						
Dry Air	lbm/10KBTU	8.52	8.64	8.62	8.89	**8.72**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**1.87**	**1.86**	**1.88**	**1.87**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.18	0.13	0.14	0.12	**0.13**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.30**	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	11.08	10.89	10.87	11.15	**10.97**
H2O in Wet Gas	lbm/10KBTU	2.05	1.72	1.71	1.73	**1.72**

COMBUSTION CALCULATIONS

DESCRIPTION	UNITS	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Dry Gas	lbm/10KBTU	9.02	9.18	9.16	9.42	**9.25**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.54	15.76	15.70	15.50	**15.65**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.24	0.31	0.30	0.30	**0.30**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	0.02	**0.02**
Leakage (Primary AH)	% Gas Entering	4.18	5.24	5.14	5.10	**5.16**
Secondary Air Inlet						
Dry Air	lbm/10KBTU	8.08	8.11	8.10	8.36	**8.19**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**1.87**	**1.86**	**1.88**	**1.87**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.17	0.12	0.13	0.11	**0.12**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.30**	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	10.63	10.35	10.34	10.61	**10.43**
H2O in Wet Gas	lbm/10KBTU	2.04	1.71	1.70	1.72	**1.71**
Dry Gas	lbm/10KBTU	8.59	8.64	8.64	8.89	**8.72**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	19.23	16.51	16.43	16.22	**16.39**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.24	0.31	0.30	0.30	**0.30**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.03	0.03	0.02	**0.03**
Secondary Air Outlet						
Dry Air	lbm/10KBTU	8.52	8.64	8.62	8.89	**8.72**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**1.87**	**1.86**	**1.88**	**1.87**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.18	0.13	0.14	0.12	**0.13**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.30**	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	11.08	10.89	10.87	11.15	**10.97**
H2O in Wet Gas	lbm/10KBTU	2.05	1.72	1.71	1.73	**1.72**
Dry Gas	lbm/10KBTU	9.02	9.18	9.16	9.42	**9.25**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.54	15.76	15.70	15.50	**15.65**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.24	0.31	0.30	0.30	**0.30**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	0.02	**0.02**
Leakage (Primary AH)	% Gas Entering	4.18	5.24	5.14	5.10	**5.16**
Gas Temperature Correction for Air Heater Leakage						
Primary Air						
Gas Temperature Leaving (Including Leakage)	Deg F	**316.00**	**307.92**	**308.96**	**309.71**	**308.86**
Corrected Air Heater Gas Outlet Temperature	Deg F	316.00	307.92	308.96	309.71	**308.86**
Secondary Air						
Gas Temperature Leaving (Including Leakage)	Deg F	**316.00**	**307.92**	**308.96**	**309.71**	**308.86**
Corrected Air Heater Gas Outlet Temperature	Deg F	316.00	307.92	308.96	309.71	**308.86**
Air , Gas, Fuel, & Residue Mass Flow Rates						
Energy Input	mmBTU/hr	1,260.46	1,169.56	1,166.36	1,167.30	**1,167.74**
Fuel Rate	Klbm/hr	264.34	225.87	223.76	226.18	**225.27**
Residue Rate	Klbm/hr	30.59	35.78	35.20	34.57	**35.18**
Wet Flue Gas	Klbm/hr	1,340.02	1,210.39	1,205.94	1,238.06	**1,218.13**
Excess Air Leaving Boiler	%	16.92	16.77	16.62	16.58	**16.66**
Total Air to Boiler	Klbm/hr	1,039.63	962.20	959.71	989.01	**970.31**

COMBUSTION CALCULATIONS

DESCRIPTION	UNITS	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
CALCULATION INPUTS					
Fuel Data					
Higher Heating Value of Fuel	BTU/lbm	4,768.40	4,768.40	4,768.40	**4,768.40**
Unburned Carbon	lbm/100 lbm fuel	0.05	0.05	0.04	**0.05**
Fuel Flow	Klbm/hr	253.01	253.18	252.02	**252.74**
Measured Fuel Flow	Klbm/hr	**0.00**	**0.00**	**0.00**	**0.00**
Calculated Fuel Flow	Klbm/hr	253.01	253.18	252.03	**252.74**
Output	mmBTU/hr	937.24	937.69	933.29	**936.07**
Fuel Efficiency	%	77.68	77.67	77.66	77.67
Ambient Data					
Moisture in Air	lbm/lbm Dry Air	0.0225	0.0225	0.0225	**0.02**
Barometeric Pressure	psia	14.58	14.58	14.58	**14.58**
Ambient Dry Bulb Temperature	Deg F	80.00	80.00	80.00	**80.00**
Ambient Wet Bulb Temperature	Deg F	78.00	78.00	78.00	**78.00**
Relative Humidity	%	91.60	91.60	91.60	**91.60**
Additional Moisture (Measured)					
Atomizing Steam	Klbm/hr	0.00	0.00	0.00	**0.00**
Sootblowing Steam	Klbm/hr	0.00	0.00	0.00	**0.00**
Moisture in Flue Gas Recirculation	Klbm/hr	33.98	33.61	33.75	**33.78**
NH3 Moisture	Klbm/hr	0.16	0.16	0.16	**0.16**
Summation Additional Moisture	Klbm/hr	29.69	29.26	29.03	**29.33**
Additional Moisture	lbm/100 lbm fuel	13.15	13.08	12.84	**13.02**
Additional Moisture	lbm/10KBTU	0.25	0.25	0.25	**0.25**
Air Heater Data					
Gas Temperature Leaving Primary Air Heater	Deg F	307.24	308.72	309.98	**308.65**
Gas Temperature Leaving Secondary Air Heater	Deg F	306.24	307.36	308.10	**307.23**
Air Temperature Entering Primary Air Heater	Deg F	107.00	107.00	107.00	**107.00**
Air Temperature Entering Secondary Air Heater	Deg F	152.00	152.00	152.00	**152.00**
O2 Entering Primary Air Heater	%	2.88	2.86	2.86	**2.87**
O2 Entering Secondary Air Heater	%	2.88	2.86	2.86	**2.87**
O2 Leaving Primary Air Heater	%	3.95	3.91	3.91	**3.92**
O2 Leaving Secondary Air Heater	%	3.95	3.91	3.91	**3.92**
Primary Air to Gas / Secondary Air to Gas Leakage Split	PA% / SA%	0 / 100	0 / 100	0 / 100	
Primary AH Leakage for Trisector Type AH	%	0.00%	0.00%	0.00%	**0.00**
Sorbent Data (Enter 0 if Sorbent not Used)					
Sorbent Rate	Klbm/hr	28.41	28.41	28.41	**28.41**
CO2 from Sorbent	lbm/100 lbm Sorbent	0.00	0.00	0.00	**0.00**
H2O from Sorbent	lbm/100 lbm Sorbent	0.00	0.00	0.00	**0.00**
Sulfur Capture	lbm/lbm Sulfur	0.00	0.00	0.00	**0.00**
Spent Sorbent	lbm/lbm Fuel	12.58	12.70	12.56	**12.61**
Sorbent/Fuel Ratio	lbm Sor/ lbm fuel	0.13	0.13	0.13	**0.13**
Ultimate Analysis (% Mass)					
Carbon, C	% Mass	27.50	27.50	27.50	**27.50**
Unburned Carbon, UBC	% Mass	0.05	0.05	0.04	**0.05**
Burned Carbon, Cb	% Mass	27.45	27.45	27.46	**27.45**
Sulfur, S	% Mass	0.01	0.01	0.01	**0.01**
Hydrogen, H2	% Mass	3.37	3.37	3.37	**3.37**
Moisture, H2O	% Mass	45.00	45.00	45.00	**45.00**
Moisture, H2O vapor	% Mass	0.00	0.00	0.00	**0.00**
Nitrogen, N2	% Mass	0.06	0.06	0.06	**0.06**
Oxygen, O2	% Mass	23.39	23.39	23.39	**23.39**
Ash	% Mass	0.71	0.71	0.71	**0.71**
Volatile Material, VM	% Mass	0.00	0.00	0.00	**0.00**
Fixed Carbon, FC	% Mass	0.00	0.00	0.00	**0.00**
Total	% Mass	**100.04**	**100.04**	**100.04**	**100.04**
COMBUSTION CALCULATIONS					
Mass of Ash	lbm/10KBTU	0.06	0.05	0.05	**0.05**
Theoretical Air Fired (lbm/100lbm Fuel)					
Burned Carbon, Cb	lbm/100lbm Fuel	315.92	316.00	316.10	**316.01**
Sulfur, S	lbm/100lbm Fuel	0.04	0.04	0.04	**0.04**
Hydrogen, H2	lbm/100lbm Fuel	115.42	115.42	115.42	**115.42**
Oxygen, O2	lbm/100lbm Fuel	-101.05	-101.05	-101.05	**-101.05**
Total	**lbm/100lbm Fuel**	330.33	330.40	330.51	**330.41**
Dry Products Fired (mol/100lbm Fuel)					
Burned Carbon, Cb	mol/100lbm Fuel	2.29	2.29	2.29	**2.29**
Sulfur, S	mol/100lbm Fuel	0.00	0.00	0.00	**0.00**
Nitrogen, N2	mol/100lbm Fuel	0.00	0.00	0.00	**0.00**
Total	mol/100lbm Fuel	**2.29**	**2.29**	**2.29**	**2.29**
Wet Products Fired (mol/100lbm Fuel)					
Hydrogen, H2	mol/100lbm Fuel	1.67	1.67	1.67	**1.67**
Moisture, H2O	mol/100lbm Fuel	2.50	2.50	2.50	**2.50**
Moisture, H2O vapor	mol/100lbm Fuel	0.00	0.00	0.00	**0.00**
Total	mol/100lbm Fuel	**4.17**	**4.17**	**4.17**	**4.17**
H2O Fuel (lbm/10KBTU)					
Hydrogen, H2	lbm/10KBTU	0.63	0.63	0.63	**0.63**
Moisture, H2O	lbm/10KBTU	0.94	0.94	0.94	**0.94**

COMBUSTION CALCULATIONS

DESCRIPTION	UNITS	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
Moisture, H2O vapor	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Total	lbm/10KBTU	**1.57**	**1.57**	**1.57**	**1.57**
Total Theoretical Air Fuel Check	lbm/10KBTU	6.94	6.94	6.94	**6.94**
Products Combusted					
CO2 from Sorbent	lbm/100lbm Fuel	0.00	0.00	0.00	**0.00**
H2O from Sorbent	lbm/100lbm Fuel	0.00	0.00	0.00	**0.00**
SO2 Reduction	mol/100lbm Fuel	0.00	0.00	0.00	**0.00**
Dry Products Combusted	mol/100lbm Fuel	2.29	2.29	2.29	**2.29**
Wet Products Combusted	mol/100lbm Fuel	6.46	6.46	6.46	**6.46**
Theoretical Air Correction	lbm/100lbm Fuel	330.33	330.40	330.51	**330.41**
Theoretical Air Correction	mol/100lbm Fuel	11.40	11.41	11.41	**11.41**
Theoretical Air Correction	lbm/10KBTU	6.93	6.93	6.93	**6.93**
Wet Gas from Fuel	lbm/10KBTU	2.08	2.08	2.08	**2.08**
CALCULATION INPUTS					
Economizer					
Flue Gas Temperature Leaving Economizer	Deg F	**491.91**	**493.37**	**493.76**	**493.02**
Flue Gas Oxygen Content Leaving Economizer	%	**2.88**	**2.86**	**2.86**	**2.87**
Air Heater Data					
Primary Air Inlet					
Flue Gas Temperature Entering Air Heater	Deg F	**491.91**	**493.37**	**493.76**	**493.02**
Air Temperature Entering Air Heater	Deg F	**107.00**	**107.00**	**107.00**	**107.00**
Flue Gas Oxygen Content Primary Air Inlet	%	**2.88**	**2.86**	**2.86**	**2.87**
Primary Air Outlet					
Flue Gas Temperature Entering Air Heater	Deg F	**307.24**	**308.72**	**309.98**	**308.65**
Air Temperature Leaving Air Heater	Deg F	**441.55**	**442.58**	**442.31**	**442.15**
Flue Gas Oxygen Content Primary Air Inlet	%	**3.95**	**3.91**	**3.91**	**3.92**
Secondary Air Inlet					
Flue Gas Temperature Entering Air Heater	Deg F	**491.91**	**493.37**	**493.76**	**493.02**
Air Temperature Entering Air Heater	Deg F	**152.00**	**152.00**	**152.00**	**152.00**
Flue Gas Oxygen Content Primary Air Inlet	%	**2.88**	**2.86**	**2.86**	**2.87**
Secondary Air Outlet					
Flue Gas Temperature Entering Air Heater	Deg F	**306.24**	**307.36**	**308.10**	**307.23**
Air Temperature Leaving Air Heater	Deg F	**424.46**	**426.39**	**426.71**	**425.85**
Flue Gas Oxygen Content Primary Air Inlet	%	**3.95**	**3.91**	**3.91**	**3.92**
ENERGY AND AIR CALCULATIONS					
Flue Gas Analysis					
Economizer					
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.29**	**2.29**	**2.29**	**2.29**
Additional Moisture	mol/100 lbm Fuel	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.01	9.02	9.02	**9.02**
Summation	mol/100 lbm Fuel	12.03	12.03	12.02	**12.03**
	mol/100 lbm Fuel	18.07	18.09	18.09	**18.08**
Excess Air	%	16.81	16.66	16.69	**16.72**
Primary Air Inlet					
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.29**	**2.29**	**2.29**	**2.29**
Additional Moisture	mol/100 lbm Fuel	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.01	9.02	9.02	**9.02**
Summation	mol/100 lbm Fuel	12.03	12.03	12.02	**12.03**
	mol/100 lbm Fuel	18.07	18.09	18.09	**18.08**
Excess Air	%	16.81	16.66	16.69	**16.72**
Primary Air Outlet					
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.29**	**2.29**	**2.29**	**2.29**
Additional Moisture	mol/100 lbm Fuel	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.01	9.02	9.02	**9.02**
Summation	mol/100 lbm Fuel	12.03	12.03	12.02	**12.03**
	mol/100 lbm Fuel	17.00	17.04	17.04	**17.03**
Excess Air	%	24.53	24.20	24.18	**24.30**
Secondary Air Inlet					
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.29**	**2.29**	**2.29**	**2.29**
Additional Moisture	mol/100 lbm Fuel	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.01	9.02	9.02	**9.02**
Summation	mol/100 lbm Fuel	12.03	12.03	12.02	**12.03**
	mol/100 lbm Fuel	18.07	18.09	18.09	**18.08**
Excess Air	%	16.81	16.66	16.69	**16.72**
Secondary Air Outlet					
Moisture in Air	mol/100 lbm Fuel	0.00	0.00	0.00	**0.00**
Dry / Wet Products of Combustion	mol/100 lbm Fuel	**2.29**	**2.29**	**2.29**	**2.29**

COMBUSTION CALCULATIONS					
DESCRIPTION	**UNITS**	**Corrected Test Run 1 11/21/2013 10:00 14:00**	**Corrected Test Run 2 11/21/2013 14:00 18:00**	**Corrected Test Run 3 11/21/2013 18:00 22:00**	**Corrected TEST RUN AVERAGE**
Additional Moisture	mol/100 lbm Fuel	0.73	0.73	0.71	**0.72**
	mol/100 lbm Fuel	9.01	9.02	9.02	**9.02**
Summation	mol/100 lbm Fuel	12.03	12.03	12.02	**12.03**
	mol/100 lbm Fuel	17.00	17.04	17.04	**17.03**
Excess Air	%	24.53	24.20	24.18	**24.30**
O2, CO2, SO2 when Excess Air is Known					
Primary Air Inlet					
Dry Air	mol/100 lbm Fuel	10.93	10.92	10.92	**10.92**
Wet Air	mol/100 lbm Fuel	10.93	10.92	10.92	**10.92**
Dry Gas	mol/100 lbm Fuel	13.22	13.21	13.21	**13.21**
Wet Gas	mol/100 lbm Fuel	17.39	17.37	17.38	**17.38**
O2	%	3.04	3.01	3.02	**3.02**
CO2	%	17.29	17.31	17.31	**17.30**
SO2	%	0.00	0.00	0.00	**0.00**
Primary Air Outlet					
Dry Air	mol/100 lbm Fuel	11.81	11.78	11.78	**11.79**
Wet Air	mol/100 lbm Fuel	11.81	11.78	11.78	**11.79**
Dry Gas	mol/100 lbm Fuel	14.10	14.07	14.07	**14.08**
Wet Gas	mol/100 lbm Fuel	18.27	18.23	18.23	**18.25**
O2	%	4.16	4.11	4.11	**4.13**
CO2	%	16.21	16.25	16.26	**16.24**
SO2	%	0.00	0.00	0.00	**0.00**
Secondary Air Inlet					
Dry Air	mol/100 lbm Fuel	10.93	10.92	10.92	**10.92**
Wet Air	mol/100 lbm Fuel	10.93	10.92	10.92	**10.92**
Dry Gas	mol/100 lbm Fuel	13.22	13.21	13.21	**13.21**
Wet Gas	mol/100 lbm Fuel	17.39	17.37	17.38	**17.38**
O2	%	3.04	3.01	3.02	**3.02**
CO2	%	17.29	17.31	17.31	**17.30**
SO2	%	0.00	0.00	0.00	**0.00**
Secondary Air Outlet					
Dry Air	mol/100 lbm Fuel	11.81	11.78	11.78	**11.79**
Wet Air	mol/100 lbm Fuel	11.81	11.78	11.78	**11.79**
Dry Gas	mol/100 lbm Fuel	14.10	14.07	14.07	**14.08**
Wet Gas	mol/100 lbm Fuel	18.27	18.23	18.23	**18.25**
O2	%	4.16	4.11	4.11	**4.13**
CO2	%	16.21	16.25	16.26	**16.24**
SO2	%	0.00	0.00	0.00	**0.00**
Flue Gas Products					
Economizer					
Dry Air	lbm/10KBTU	8.09	8.08	8.09	**8.09**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**2.08**	**2.08**	**2.08**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.18	0.18	0.18	**0.18**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	10.61	10.60	10.60	**10.60**
H2O in Wet Gas	lbm/10KBTU	2.01	2.01	2.01	**2.01**
Dry Gas	lbm/10KBTU	8.60	8.59	8.59	**8.59**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.95	18.94	18.92	**18.94**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.28	0.28	0.28	**0.28**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	**0.02**
Primary Air Inlet					
Dry Air	lbm/10KBTU	8.09	8.08	8.09	**8.09**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**2.08**	**2.08**	**2.08**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.18	0.18	0.18	**0.18**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	10.61	10.60	10.60	**10.60**
H2O in Wet Gas	lbm/10KBTU	2.01	2.01	2.01	**2.01**
Dry Gas	lbm/10KBTU	8.60	8.59	8.59	**8.59**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.95	18.94	18.92	**18.94**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.28	0.28	0.28	**0.28**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	**0.02**
Primary Air Outlet					
Dry Air	lbm/10KBTU	8.63	8.61	8.61	**8.61**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**2.08**	**2.08**	**2.08**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.19	0.19	0.19	**0.19**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	11.16	11.13	11.13	
H2O in Wet Gas	lbm/10KBTU	2.02	2.02	2.02	**2.02**

COMBUSTION CALCULATIONS					
DESCRIPTION	**UNITS**	**Corrected Test Run 1 11/21/2013 10:00 14:00**	**Corrected Test Run 2 11/21/2013 14:00 18:00**	**Corrected Test Run 3 11/21/2013 18:00 22:00**	**Corrected TEST RUN AVERAGE**
Dry Gas	lbm/10KBTU	9.13	9.11	9.11	**9.12**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.13	18.14	18.12	**18.13**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.28	0.28	0.28	**0.28**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	**0.02**
Leakage (Primary AH)	% Gas Entering	5.15	5.04	5.01	**5.07**
Secondary Air Inlet					
Dry Air	lbm/10KBTU	8.09	8.08	8.09	**8.09**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**2.08**	**2.08**	**2.08**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.18	0.18	0.18	**0.18**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	10.61	10.60	10.60	**10.60**
H2O in Wet Gas	lbm/10KBTU	2.01	2.01	2.01	**2.01**
Dry Gas	lbm/10KBTU	8.60	8.59	8.59	**8.59**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.95	18.94	18.92	**18.94**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.28	0.28	0.28	**0.28**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	**0.02**
Secondary Air Outlet					
Dry Air	lbm/10KBTU	8.63	8.61	8.61	**8.61**
Wet Gas from Fuel	lbm/10KBTU	**2.08**	**2.08**	**2.08**	**2.08**
CO2 from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/10KBTU	0.19	0.19	0.19	**0.19**
Water from Sorbent	lbm/10KBTU	0.00	0.00	0.00	**0.00**
Additional Moisture	lbm/10KBTU	**0.25**	**0.25**	**0.25**	**0.25**
Total Wet Gas	lbm/10KBTU	11.16	11.13	11.13	**11.14**
H2O in Wet Gas	lbm/10KBTU	2.02	2.02	2.02	**2.02**
Dry Gas	lbm/10KBTU	9.13	9.11	9.11	**9.12**
H2O in Wet Gas, % Mass	lbm H2O/lbm Wet Gas	18.13	18.14	18.12	**18.13**
Residue, lbm / lbm Total Refuse at each location	lbm/lbm total Residue	**0.88**	**0.88**	**0.88**	**0.88**
Residue	lbm/10KBTU	0.28	0.28	0.28	**0.28**
Residue in Wet Gas	lbm/lbm Wet Gas	0.02	0.02	0.02	**0.02**
Leakage (Primary AH)	% Gas Entering	5.15	5.04	5.01	**5.07**
Gas Temperature Correction for Air Heater Leakage					
Primary Air					
Gas Temperature Leaving (Including Leakage)	Deg F	**307.24**	**308.72**	**309.98**	**308.65**
Corrected Air Heater Gas Outlet Temperature	Deg F	307.24	308.72	309.98	**308.65**
Secondary Air					
Gas Temperature Leaving (Including Leakage)	Deg F	**306.24**	**307.36**	**308.10**	**307.23**
Corrected Air Heater Gas Outlet Temperature	Deg F	306.24	307.36	308.10	**307.23**
Air , Gas, Fuel, & Residue Mass Flow Rates					
Energy Input	mmBTU/hr	1,206.47	1,207.26	1,201.76	**1,205.16**
Fuel Rate	Klbm/hr	253.01	253.18	252.03	**252.74**
Residue Rate	Klbm/hr	33.75	34.06	33.54	**33.78**
Wet Flue Gas	Klbm/hr	1,279.99	1,279.37	1,273.87	**1,277.74**
Excess Air Leaving Boiler	%	16.81	16.66	16.69	**16.72**
Total Air to Boiler	Klbm/hr	998.28	997.82	993.83	**996.64**

RESIDUE CALCULATIONS

DESCRIPTION	UNITS	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
CALCULATION INPUTS						
Data Required for Residue Split and Mass Flow						
Ash in Fuel	%	0.71	3.04	2.85	2.59	**2.83**
HHV Fuel	BTU/lbm Fuel	4,768.40	5,178.09	5,212.47	5,160.90	**5,183.82**
Fuel Mass Flow Rate	Klbm/hr	264.34	225.87	223.76	226.18	**225.27**
Residue Rate	Klbm/hr	30.59	35.78	35.20	34.57	**35.18**
Carbon in Residue						
Bottom Ash	%	15.00	0.13	0.09	0.04	**0.09**
Fly Ash	%	15.00	7.76	6.87	5.61	**6.74**
Economizer Hopper Ash	%	0.00	0.49	0.52	0.35	**0.45**
Air Heater Hopper Ash	%	0.00	0.49	0.52	0.35	**0.45**
Total	%	30.00	8.87	8.00	6.35	**7.74**
Carbon Dioxide in Residue						
Bottom Ash	%	0.10	0.10	0.10	0.10	**0.10**
Fly Ash	%	0.10	0.10	0.10	0.10	**0.10**
Economizer Hopper Ash	%	0.00	0.00	0.00	0.00	**0.00**
Air Heater Hopper Ash	%	0.00	0.00	0.00	0.00	**0.00**
Total	%	0.20	0.20	0.20	0.20	**0.20**
Residue Split						
Bottom Ash	%	5.00	5.00	5.00	5.00	**5.00**
Fly Ash	%	88.00	88.00	88.00	88.00	**88.00**
Economizer Hopper Ash	%	5.00	5.00	5.00	5.00	**5.00**
Air Heater Hopper Ash	%	2.00	2.00	2.00	2.00	**2.00**
Total	%	100.00	100.00	100.00	100.00	**100.00**
Residue Location Temperature						
Bottom Ash	Deg F	1,500.00	1,500.00	1,500.00	1,500.00	**1,500.00**
Fly Ash	Deg F	441.00	414.84	419.70	416.84	**417.13**
Economizer Hopper Ash	Deg F	498.00	491.91	493.37	493.76	**493.02**
Air Heater Hopper Ash Temperature	Deg F	316.00	307.92	308.96	309.71	**308.86**
Ash Flow Basis - by Split or Measured Bottom Ash		Assume	Assume	Assume	Assume	
Meassured Bottom Ash Flow Rate	Klbm/hr	75.00	75.00	75.00	75.00	**75.00**
INTERMEDIATE CALCULATIONS						
Residue Mass Flow (Measured or Calculated)						
Bottom Ash	Klbm/hr	1.53	1.79	1.76	1.73	**1.76**
Fly Ash	Klbm/hr	26.92	31.49	30.98	30.42	**30.96**
Economizer Hopper Ash	Klbm/hr	1.53	1.79	1.76	1.73	**1.76**
Air Heater Hopper Ash	Klbm/hr	0.61	0.72	0.70	0.69	**0.70**
		0.00	0.00	0.00	0.00	**0.00**
Total	Klbm/hr	30.59	35.78	35.20	34.57	**35.18**
Weighted Average of Carbon in Residue						
Bottom Ash	%	0.75	0.01	0.00	0.00	**0.00**
Fly Ash	%	13.20	6.83	6.04	4.93	**5.93**
Economizer Hopper Ash	%	0.00	0.02	0.03	0.02	**0.02**
Air Heater Hopper Ash	%	0.00	0.01	0.01	0.01	**0.01**
Total	%	13.95	6.87	6.08	4.96	**5.97**
Weighted Average of Carbon Dioxide in Residue						
Bottom Ash	%	0.01	0.01	0.01	0.01	**0.01**
Fly Ash	%	0.09	0.09	0.09	0.09	**0.09**
Economizer Hopper Ash	%	0.00	0.00	0.00	0.00	**0.00**
Air Heater Hopper Ash	%	0.00	0.00	0.00	0.00	**0.00**
Total	%	0.09	0.09	0.09	0.09	**0.09**
RESIDUE CALCULATIONS						
Units without Sorbent						
Unburned Carbon	bm/100 lbm fue	0.12	0.22	0.18	0.14	**0.18**
Total Residue	bm/100 lbm fue	0.82	3.26	3.03	2.73	**3.01**
Units with Sorbent						
Unburned Carbon	bm/100 lbm fue	-	-	-	-	
Total Residue	bm/100 lbm fue	-	-	-	-	
Total Residue						
Total Residue	Klbm/hr	2.18	7.37	6.79	6.16	**6.78**
Total Residue	lbm/10KBTU	0.02	0.06	0.06	0.05	**0.06**
Sensible Heat Residue Loss						
Bottom Ash	%	0.00	0.01	0.01	0.01	**0.01**
Fly Ash	%	0.01	0.04	0.04	0.03	**0.04**
Economizer Hopper Ash	%	0.00	0.00	0.00	0.00	**0.00**
Air Heater Hopper Ash Temperature	%	0.00	0.00	0.00	0.00	**0.00**
Total	%	**0.02**	**0.05**	**0.05**	**0.05**	**0.05**

RESIDUE CALCULATIONS

DESCRIPTION	UNITS	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
CALCULATION INPUTS					
Data Required for Residue Split and Mass Flow					
Ash in Fuel	%	0.71	0.71	0.71	**0.71**
HHV Fuel	BTU/lbm Fuel	4,768.40	4,768.40	4,768.40	**4,768.40**
Fuel Mass Flow Rate	Klbm/hr	253.01	253.18	252.03	**252.74**
Residue Rate	Klbm/hr	33.75	34.06	33.54	**33.78**
Carbon in Residue					
Bottom Ash	%	0.13	0.09	0.04	**0.09**
Fly Ash	%	7.76	6.87	5.61	**6.74**
Economizer Hopper Ash	%	0.49	0.52	0.35	**0.45**
Air Heater Hopper Ash	%	0.49	0.52	0.35	**0.45**
Total	%	8.87	8.00	6.35	**7.74**
Carbon Dioxide in Residue					
Bottom Ash	%	0.10	0.10	0.10	**0.10**
Fly Ash	%	0.10	0.10	0.10	**0.10**
Economizer Hopper Ash	%	0.00	0.00	0.00	**0.00**
Air Heater Hopper Ash	%	0.00	0.00	0.00	**0.00**
Total	%	0.20	0.20	0.20	**0.20**
Residue Split					
Bottom Ash	%	5.00	5.00	5.00	**5.00**
Fly Ash	%	88.00	88.00	88.00	**88.00**
Economizer Hopper Ash	%	5.00	5.00	5.00	**5.00**
Air Heater Hopper Ash	%	2.00	2.00	2.00	**2.00**
Total	%	100.00	100.00	100.00	**100.00**
Residue Location Temperature					
Bottom Ash	Deg F	1,500.00	1,500.00	1,500.00	**1,500.00**
Fly Ash	Deg F	414.84	419.70	416.84	**417.13**
Economizer Hopper Ash	Deg F	491.91	493.37	493.76	**493.02**
Air Heater Hopper Ash Temperature	Deg F	307.92	308.96	309.71	**308.86**
Ash Flow Basis - by Split or Measured Bottom Ash		Assume	Assume	Assume	
Meassured Bottom Ash Flow Rate	Klbm/hr	75.00	75.00	75.00	**75.00**
INTERMEDIATE CALCULATIONS					
Residue Mass Flow (Measured or Calculated)					
Bottom Ash	Klbm/hr	1.69	1.70	1.68	**1.69**
Fly Ash	Klbm/hr	29.70	29.97	29.51	**29.73**
Economizer Hopper Ash	Klbm/hr	1.69	1.70	1.68	**1.69**
Air Heater Hopper Ash	Klbm/hr	0.68	0.68	0.67	**0.68**
		0.00	0.00	0.00	**0.00**
Total	Klbm/hr	33.75	34.06	33.54	**33.78**
Weighted Average of Carbon in Residue					
Bottom Ash	%	0.01	0.00	0.00	**0.00**
Fly Ash	%	6.83	6.04	4.93	**5.93**
Economizer Hopper Ash	%	0.02	0.03	0.02	**0.02**
Air Heater Hopper Ash	%	0.01	0.01	0.01	**0.01**
Total	%	6.87	6.08	4.96	**5.97**
Weighted Average of Carbon Dioxide in Residue					
Bottom Ash	%	0.01	0.01	0.01	**0.01**
Fly Ash	%	0.09	0.09	0.09	**0.09**
Economizer Hopper Ash	%	0.00	0.00	0.00	**0.00**
Air Heater Hopper Ash	%	0.00	0.00	0.00	**0.00**
Total	%	0.09	0.09	0.09	**0.09**
RESIDUE CALCULATIONS					
Units without Sorbent					
Unburned Carbon	bm/100 lbm fue	0.05	0.05	0.04	**0.05**
Total Residue	bm/100 lbm fue	0.76	0.76	0.75	**0.75**
Units with Sorbent					
Unburned Carbon	bm/100 lbm fue	-	-	-	
Total Residue	bm/100 lbm fue	-	-	-	
Total Residue					
Total Residue	Klbm/hr	1.93	1.91	1.88	**1.91**
Total Residue	lbm/10KBTU	0.02	0.02	0.02	**0.02**
Sensible Heat Residue Loss					
Bottom Ash	%	0.00	0.00	0.00	**0.00**
Fly Ash	%	0.01	0.01	0.01	**0.01**
Economizer Hopper Ash	%	0.00	0.00	0.00	**0.00**
Air Heater Hopper Ash Temperature	%	0.00	0.00	0.00	**0.00**
Total	%	**0.01**	**0.01**	**0.01**	**0.01**

RADIATION LOSS CALCULATION

DESCRIPTION	UNITS	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	AVERAGE 11/21/2013 10:00 18:00
Furnace - Water Walls						
Average Velocity of Air Near Surface	ft/min	**100.000**	**100.000**	**100.000**	**100.000**	**100.000**
Temperature Difference	Deg F	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
Total Radiant Surface	ft^2	**24,756.99**	**24,756.99**	**24,756.99**	**24,756.99**	**24,756.99**
Total Convective Surface	ft^2	**2,798.62**	**2,798.62**	**2,798.62**	**2,798.62**	**2,798.62**
Convection Heat Transfer Coefficient	Btu/hr ft^2 F	13.93	13.93	13.93	13.93	**13.93**
Radiation Heat Transfer Coefficient	Btu/hr ft^2 F	0.97	0.97	0.97	0.97	**0.97**
Loss	MKBTU/hr	2.05	2.05	2.05	2.05	**2.05**
Superheater						
Average Velocity of Air Near Surface	ft/min	**100.000**	**100.000**	**100.000**	**100.000**	**100.00**
Temperature Difference	Deg F	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
Flat Projected Surface Area	ft^2	**18,600.04**	**18,600.04**	**18,600.04**	**18,600.04**	**18,600.04**
Convection Heat Transfer Coefficient	Btu/hr ft^2 F	13.93	13.93	13.93	13.93	**13.93**
Radiation Heat Transfer Coefficient	Btu/hr ft^2 F	0.97	0.97	0.97	0.97	**0.97**
Loss	MKBTU/hr	1.39	1.39	1.39	1.39	**1.39**
Reheater						
Average Velocity of Air Near Surface	ft/min	**100.000**	**100.000**	**100.000**	**100.000**	**100.00**
Temperature Difference	Deg F	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
Flat Projected Surface Area	ft^2	**4,357.23**	**4,357.23**	**4,357.23**	**4,357.23**	**4,357.23**
Convection Heat Transfer Coefficient	Btu/hr ft^2 F	13.93	13.93	13.93	13.93	**13.93**
Radiation Heat Transfer Coefficient	Btu/hr ft^2 F	0.97	0.97	0.97	0.97	**0.97**
Loss	MKBTU/hr	0.32	0.32	0.32	0.32	**0.32**
Economizer						
Average Velocity of Air Near Surface	ft/min	**100.000**	**100.000**	**100.000**	**100.000**	**100.00**
Temperature Difference	Deg F	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
Flat Projected Surface Area	ft^2	**6,454.90**	**6,454.90**	**6,454.90**	**6,454.90**	**6,454.90**
Convection Heat Transfer Coefficient	Btu/hr ft^2 F	13.93	13.93	13.93	13.93	**13.93**
Radiation Heat Transfer Coefficient	Btu/hr ft^2 F	0.97	0.97	0.97	0.97	**0.97**
Loss	MKBTU/hr	0.48	0.48	0.48	0.48	**0.48**
Air Preheater						
Average Velocity of Air Near Surface	ft/min	**100.000**	**100.000**	**100.000**	**100.000**	**100.00**
Temperature Difference	Deg F	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
Flat Projected Surface Area	ft^2	**24,059.49**	**24,059.49**	**24,059.49**	**24,059.49**	**24,059.49**
Convection Heat Transfer Coefficient	Btu/hr ft^2 F	13.93	13.93	13.93	13.93	**13.93**
Radiation Heat Transfer Coefficient	Btu/hr ft^2 F	0.97	0.97	0.97	0.97	**0.97**
Loss	MKBTU/hr	1.79	1.79	1.79	1.79	**1.79**
Loss Due To Radiation and Convection	MKBTU/hr	**6.04**	**6.04**	**6.04**	**6.04**	**6.04**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
INPUT DATA							
Results from Combustion Calculations							
Energy Input	mmBTU/hr		1,260.46	1,169.56	1,166.36	1,167.30	**1,167.74**
Dry Gas Weight at Primary Air Heater 2 Inlet	lbm/10KBTU	*MqDFg*	8.59	8.64	8.64	8.89	**8.72**
Dry Gas Weight at Primary Air Heater 1 Outlet	lbm/10KBTU		9.02	9.18	9.16	9.42	**9.25**
Wet Gas Weight at Primary Air Heater 2 Inlet	lbm/10KBTU		10.63	10.35	10.34	10.61	**10.43**
Wet Gas Weight at Primary Air Heater 1 Outlet	lbm/10KBTU		11.08	10.89	10.87	11.15	**10.97**
Wet Gas Mass Flow at Primary Air Heater 2 Inlet	lbm/hr		1,340,016	1,210,391	1,205,936	1,238,058	**1,218,128**
Wet Gas Mass Flow at Primary Air Heater 1 Outlet	lbm/hr		1,396,043	1,273,790	1,267,865	1,301,176	**1,280,944**
Dry Air Weight	lbm/10KBTU	*MqDA*	8.08	8.11	8.10	8.36	**8.19**
Water from H2 Fuel	lbm/10KBTU	*MqWH2F*	0.63	0.61	0.61	0.63	**0.61**
Water from H2O Fuel	lbm/10KBTU	*MqWF*	0.94	0.73	0.72	0.73	**0.72**
Water from H2Ov Fuel	lbm/10KBTU		0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/lbm Dry Air	*MFrWA*	0.02	0.01	0.02	0.01	**0.01**
Moisture in Air	lbm/10KBTU	*MFrWA*MqDA*	0.17	0.12	0.13	0.11	**0.12**
Estimated Fuel Rate	Klbm/hr		264.34	225.87	223.76	226.18	**225.27**
Unburned Carbon	lbm/100 lbm fuel	*MpUbC*	0.12	0.22	0.18	0.14	**0.18**
Heating Value	BTU/lbm	*HHVF*	4,768.40	5,178.09	5,212.47	5,160.90	**5,183.82**
Energy Input	mmBTU/h		1,260.46	1,169.56	1,166.36	1,167.30	**1,167.74**
Energy Output	mmBTU/h	*Qo*	965.81	937.24	937.69	933.29	**936.07**
Air Temperatures and Flows							
Barometric Pressure			14.58	14.74	14.73	14.74	**14.74**
Ambient Dry Bulb Temperature			80.00	74.66	75.32	70.07	**73.35**
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)			107.00	108.40	107.50	106.41	**107.44**
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)			379.75	357.34	357.89	357.42	**357.55**
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)			379.75	357.34	357.89	357.42	**357.55**
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)			472.00	441.55	442.58	442.31	**442.15**
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)			152.00	155.07	154.95	154.96	**154.99**
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)			372.44	356.38	357.78	358.02	**357.39**
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)			372.44	356.38	357.78	358.02	**357.39**
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)			447.00	424.46	426.39	426.71	**425.85**
Primary Air Temperature Entering	Deg F	*TMn8C*	107.00	108.40	107.50	106.41	**107.44**
Primary Air Temperature Leaving	Deg F	*TMn9A*	472.00	441.55	442.58	442.31	**442.15**
Secondary Air Temperature Entering	Deg F	*TMn8B*	152.00	155.07	154.95	154.96	**154.99**
Primary Air Flow	Klbm/hr	*Mr11*	269.92	325.36	326.01	336.90	**329.42**
Total Airflow	Klbm/hr		1,039.63	962.20	959.71	989.01	**970.31**
Flue Gas Temperatures and Flows							
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)			498.00	491.91	493.37	493.76	**493.02**
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)			452.00	426.94	431.73	428.66	**429.11**
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)			430.00	402.75	407.68	405.02	**405.15**
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)			316.00	307.92	308.96	309.71	**308.86**
Average Flue Gas Recirculation Temperature			366.00	367.49	368.55	369.32	**368.45**
Flue Gas Recirc Flow Rate	lbm/hr		204,100	187,405	185,309	186,277	**186,330**
Flue Gas Temperature Leaving Primary AH	Deg F	*TMn15*	316.00	307.92	308.96	309.71	**308.86**
Flue Gas Temperature Leaving Secondary AH	Deg F	*TMn15*	316.00	307.92	308.96	309.71	**308.86**
Total Gas Entering Air Heaters	Klbm/hr		1,340.02	1,210.39	1,205.94	1,238.06	**1,218.13**
Other Temperatures							
Reference Temperature	Deg F		77.00	77.00	77.00	77.00	**77.00**
Enthalpy of Water (32 F Reference)	BTU/lbm	*HWRe*	45.07	45.07	45.07	45.07	**45.07**
Fuel Temperature	Deg F		80.06	95.00	95.00	95.00	**95.00**
Mass Fractions							
Mass Fraction of Fixed Carbon		*MFrFc*	0.00	0.00	0.00	0.00	**0.00**
Mass Fraction of Volatile Matter			0.00	0.00	0.00	0.00	**0.00**
Mass Fraction of Moisture	-	*MFrW*	0.00	0.00	0.00	0.00	**0.00**
Mass Fraction of Ash	-	*MFrRs*	0.00	0.00	0.00	0.00	**0.00**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Ammonia							
Aqueous ammonia to SCR (19% NH3)	lbm/hr		400.00	162.96	161.77	162.39	**162.38**
Aqueous Ammonia Pressure			30.00	30.00	30.00	30.00	**30.00**
Temperature of Aqueous Ammonia			80.00	74.66	75.32	70.07	**73.35**
Aqueous Ammonia Enthalpy			48.15	42.82	43.48	38.23	**41.51**
Primary Air Flow to NH3 Vaporizer	lbm/hr		2,256.60	2,256.60	2,254.95	2,254.79	**2,255.44**
Dry Air Flow to NH3	lbm/hr		2,210.23	2,223.57	2,219.47	2,224.59	**2,222.54**
Temperature of Air to Vaporizer			379.75	357.34	357.89	357.42	**357.55**
Enthalpy of Dry Air to Vaporizer			73.24	67.76	67.90	67.78	**67.81**
Enthalpy of Moisture in Air to Vaporizer			137.20	126.85	127.10	126.89	**126.95**
			137.20	126.85	127.10	126.89	**126.95**
Temperature of Air/Ammonia after Vaporizer before flue gas			212.55	213.10	213.06	213.12	**213.09**
Enthalpy of Dry Air After Vaporizer			32.62	32.75	32.74	32.76	**32.75**
Enthalpy of Moisture in Air After Vaporizer		*1105.43934*	1,150.62	1,150.82	1,150.81	1,150.83	**1,150.82**
Total Moisture	lbm/hr		446.37	195.99	197.24	192.59	**195.27**
Energy of Mixed Ammonia/Air	BTU/hr		585,698.07	298,371.98	299,660.48	294,515.77	**297,516.08**
MASS FRACTION CALCULATIONS							
Mass Fraction of Volatile Matter on Dry and Ash free		*MFrVm*	0.00	0.00	0.00	0.00	**0.00**
Mass Fraction of Volatile Matter 1		*MFrVm1*	0.00	0.00	0.00	0.00	**0.00**
Mass Fraction of Volatile Matter 2	-	*MFrVm2*	0.00	0.00	0.00	0.00	**0.00**
ENTHALPY CALCULATIONS							
Enthalpy of Dry Air	BTU/lbm	*HDAEn*	15.21	14.96	14.85	14.76	**14.86**
Enthalpy of Water Vapor	BTU/lbm	*HWvEn*	28.28	27.82	27.61	27.43	**27.62**
Enthalpy of Dry Gas	BTU/lbm	*HDFgLvCr*	57.18	55.21	55.47	55.65	**55.44**
Enthalpy of Steam @ 1 PSIA	BTU/lbm	*HStLvCr*	1,203.08	1,199.37	1,199.85	1,200.20	**1,199.81**
Enthalpy of Water Vapor	BTU/lbm	*HWvLvCr*	107.85	104.15	104.62	104.97	**104.58**
Enthalpy of Fuel	BTU/lbm	*HFEn*	10.80	10.80	10.80	10.80	**10.80**
Enthalpy of Fixed Carbon	BTU/lbm	*HFc*	0.56	3.34	3.34	3.34	**3.34**
Enthalpy of Volatile Matter 1	BTU/lbm	*HVm1*	1.26	7.53	7.53	7.53	**7.53**
Enthalpy of Volatile Matter 2	BTU/lbm	*HVm2*	2.22	13.13	13.13	13.13	**13.13**
Enthalpy of Moisture	BTU/lbm	*HW*	3.06	18.00	18.00	18.00	**18.00**
Enthalpy of Ash	BTU/lbm	*HRs*	0.56	3.31	3.31	3.31	**3.31**
Primary Air Entering Air Heater 1							
Enthalpy of Dry Air	BTU/lbm	*HDAEn8C*	7.20	7.54	7.32	7.06	**7.31**
Enthalpy of Water Vapor	BTU/lbm	*HWv8C*	13.37	14.00	13.59	13.11	**13.57**
Enthalpy of Wet Air	BTU/lbm	*HA8C*	7.32	7.63	7.42	7.14	**7.40**
Primary Air Entering Air Heater 2							
Enthalpy of Dry Air			73.24	67.76	67.90	67.78	**67.81**
Enthalpy of Water Vapor			1,230.44	1,219.84	1,220.10	1,219.88	**1,219.94**
Enthalpy of Wet Air			96.54	84.38	85.74	83.01	**84.38**
Primary Air Leaving Air Heater 2							
Enthalpy of Dry Air	BTU/lbm	*HDAEn9A*	95.91	88.40	88.66	88.59	**88.55**
Enthalpy of Water Vapor	BTU/lbm	*HWv9A*	1,274.06	1,259.61	1,260.10	1,259.98	**1,259.90**
Enthalpy of Wet Air	BTU/lbm	*HA9A*	119.63	105.30	106.80	104.07	**105.39**
Flue Gas Entering PA AH 2 and SA AH 3							
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgEn*	331.58	298.12	297.59	295.17	**296.96**
Enthalpy of Dry Gas Leaving	BTU/lbm		102.05	100.53	100.90	100.99	**100.81**
Enthalpy of Moisture in Gas	BTU/lbm		1,286.42	1,283.51	1,284.21	1,284.39	**1,284.04**
Enthalpy of Moisture in Refuse	BTU/lbm		90.58	89.11	89.46	89.56	**89.38**
Flue Gas Leaving PA AH 2 and SA AH 3							
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	317.90	279.16	279.60	276.22	**278.33**
Enthalpy of Dry Gas Leaving	BTU/lbm		90.60	84.39	85.57	84.81	**84.92**
Enthalpy of Moisture in Gas	BTU/lbm		1,264.58	1,252.70	1,254.97	1,253.51	**1,253.73**
Enthalpy of Moisture in Refuse	BTU/lbm		79.57	73.66	74.78	74.06	**74.17**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
Flue Gas Entering PA AH 1 and SA AH 2							
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	309.90	270.37	270.85	267.70	**269.64**
Enthalpy of Dry Gas Leaving	BTU/lbm		85.14	78.42	79.63	78.98	**79.01**
Enthalpy of Moisture in Gas	BTU/lbm		1,254.17	1,241.27	1,243.60	1,242.35	**1,242.41**
Flue Gas Leaving PA AH 1 and SA AH 1							
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	276.96	243.60	242.99	240.86	**242.48**
Enthalpy of Dry Gas Leaving	BTU/lbm		57.18	55.21	55.47	55.65	**55.44**
Enthalpy of Moisture in Gas	BTU/lbm		1,200.34	1,196.48	1,196.97	1,197.32	**1,196.92**
Flue Gas Recirculation							
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	291.36	260.39	259.77	257.62	**259.26**
Enthalpy of Dry Gas Leaving	BTU/lbm		69.39	69.75	70.01	70.20	**69.99**
Enthalpy of Moisture in Gas	BTU/lbm		1,223.95	1,224.63	1,225.14	1,225.50	**1,225.09**
AUX POWER AND RADIATION LOSSES							
Auxiliary Equipment Power	mmBTU/h	*QrBX*	0.00	0.00	0.00	0.00	**0.00**
Auxiliary Equipment Power	%	*QpBX*	0.00	0.00	0.00	0.00	**0.00**
Loss Due to Surface Radiation	%	*QpLSrc*	0.20	0.20	0.20	0.20	**0.20**
CALCULATED ENTERING AIR (PRIMARY AND SECONDARY) FLOW AND TEMPERATURE							
Pulverizer Tempering Airflow	Klbm/hr	*MrA5*	0.00	0.00	0.00	0.00	**0.00**
Secondary Airflow	Klbm/hr	*Mr8B*	769.71	636.84	633.70	652.11	**640.88**
Average Temperature Entering Air Heater	Deg F	*TMnAEn*	140.32	139.29	138.83	138.43	**138.85**
Average Entering Air Temperature	Deg F	*TMnAEn*	140.32	139.29	138.83	138.43	**138.85**
CALCULATED FLUE GAS FLOW AND TEMPERATURE							
Flue Gas Flow Entering Primary AH	Klbm/hr		555.03	582.82	593.44	601.24	**592.50**
Flue Gas Flow Entering Secondary AH	Klbm/hr		784.99	627.57	612.49	636.82	**625.63**
Average Exit Gas Temperature	Deg F	*TFgLvCr*	316.00	307.92	308.96	309.71	**308.86**
Average Exit Gas Temperature (Excluding Leakage)	Deg F	*TFgLvCr*	316.00	307.92	308.96	309.71	**308.86**
STANDARD LOSS CALCULATIONS							
LOSSES, %							
Dry Gas - PA AH 2 Outlet	%	*QpLDfg*	7.78	7.29	7.39	7.54	**7.41**
Wet Air to Ammonia Vaporizer and Hydrous Ammonia	%		0.05	0.03	0.03	0.03	**0.03**
Dry Gas - PA AH 1 Outlet	%		5.16	5.07	5.08	5.24	**5.13**
Bottom Ash Cooling			0.00	0.13	0.12	0.12	**0.13**
Water from H2 Fuel	%	*QpLH2F*	7.31	7.03	6.99	7.24	**7.09**
Water from H2O Fuel	%	*QpLWF*	10.93	8.39	8.26	8.47	**8.37**
Water from H2Ov Fuel	%	*QpLWvF*	0.00	0.00	0.00	0.00	**0.00**
Moisture in Air	%	*QpLWA*	0.18	0.12	0.13	0.12	**0.12**
Unburned Carbon in Residue	%	*QpLUbC*	0.35	0.63	0.51	0.38	**0.51**
Hot Air Quality Control Equipment	%	*QpLAq*	0.00	0.00	0.00	0.00	**0.00**
Additional Moisture from Flue Gas Recirc	%		3.60	3.02	2.99	2.96	**2.99**
CREDITS, %							
Entering Dry Gas - PA AH 1 Inlet			7.68	7.19	7.30	7.44	**7.31**
Hydrous Ammonia			0.04	0.02	0.02	0.02	**0.02**
Entering Wet Gas - Flue Gas Recirculation			4.72	4.17	4.13	4.11	**4.14**
Entering Dry Air	%	*QpBDA*	1.23	1.21	1.20	1.23	**1.22**
Moisture in Air	%	*QpBWA*	0.05	0.03	0.04	0.03	**0.03**
Sensible Heat in Fuel	%	*QpBF*	0.23	0.21	0.21	0.21	**0.21**
Sensible Heat from Sorbent	mmBTU/hr		0.02	-0.01	-0.01	-0.04	**-0.02**
Steam Coil Air Heater			1.05	1.18	1.28	1.23	**1.23**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	DESIGN	Test Run 1 11/21/2013 10:00 14:00	Test Run 2 11/21/2013 14:00 18:00	Test Run 3 11/21/2013 18:00 22:00	TEST RUN AVERAGE
OTHER LOSSES AND CREDITS							
Sodium Bicarbonate Credit							
Sodium Bicarbonate Flow	lb/hr		120.00	120.00	120.00	120.00	**120.00**
Latent Energy from NaHCO3 and HCl	BTU/lb	Hf	**125.41**	**125.41**	**125.41**	**125.41**	**125.41**
Latent Energy from NaHCO3 and HF	BTU/lb	Hf	**131.37**	**131.37**	**131.37**	**131.37**	**131.37**
Percent of NaHCO3 Reacted with HCl	%		10.00	10.00	10.00	10.00	**10.00**
Percent of NaHCO3 Reacted with HF	%		10.00	10.00	10.00	10.00	**10.00**
Specific Heat of Sodium Bicarbonate	BTU/lb-F	Cp	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**
Total Latent Heat from NaHCO3	mmBTU/hr		0.0031	0.0031	0.0031	0.0031	**0.0031**
Sensible Heat of Sodium Bicarbonate	mmBTU/hr		0.0001	-0.0001	-0.0001	-0.0002	**-0.0001**
Total NaHCO3 Credit	mmBTU/hr		0.0032	0.0030	0.0030	0.0029	**0.0030**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
INPUT DATA						
Results from Combustion Calculations						
Energy Input	mmBTU/hr		1,206.47	1,207.26	1,201.76	**1,205.16**
Dry Gas Weight at Primary Air Heater 2 Inlet	lbm/10KBTU	*MqDFg*	8.60	8.59	8.59	**8.59**
Dry Gas Weight at Primary Air Heater 1 Outlet	lbm/10KBTU		9.13	9.11	9.11	**9.12**
Wet Gas Weight at Primary Air Heater 2 Inlet	lbm/10KBTU		10.61	10.60	10.60	**10.60**
Wet Gas Weight at Primary Air Heater 1 Outlet	lbm/10KBTU		11.16	11.13	11.13	**11.14**
Wet Gas Mass Flow at Primary Air Heater 2 Inlet	lbm/hr		1,279,992	1,279,364	1,273,869	**1,277,741.80**
Wet Gas Mass Flow at Primary Air Heater 1 Outlet	lbm/hr		1,345,916	1,343,881	1,337,634	**1,342,477.02**
Dry Air Weight	lbm/10KBTU	*MqDA*	8.09	8.08	8.09	**8.09**
Water from H2 Fuel	lbm/10KBTU	*MqWH2F*	0.63	0.63	0.63	**0.63**
Water from H2O Fuel	lbm/10KBTU	*MqWF*	0.94	0.94	0.94	**0.94**
Water from H2Ov Fuel	lbm/10KBTU		0.00	0.00	0.00	**0.00**
Moisture in Air	lbm/lbm Dry Air	*MFrWA*	0.02	0.02	0.02	**0.02**
Moisture in Air	lbm/10KBTU	*MFrWA*MqDA*	0.18	0.18	0.18	**0.18**
Estimated Fuel Rate	Klbm/hr		253.01	253.18	252.03	**252.74**
Unburned Carbon	lbm/100 lbm fuel	*MpUbC*	0.05	0.05	0.04	**0.05**
Heating Value	BTU/lbm	*HHVF*	4,768.40	4,768.40	4,768.40	**4,768.40**
Energy Input	mmBTU/h		1,206.47	1,207.26	1,201.76	**1,205.16**
Energy Output	mmBTU/h	*Qo*	937.24	937.69	933.29	**936.07**
Air Temperatures and Flows						
Barometric Pressure			14.58	14.58	14.58	**14.58**
Ambient Dry Bulb Temperature			80.00	80.00	80.00	**80.00**
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)			107.00	107.00	107.00	**107.00**
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)			357.34	357.89	357.42	**357.55**
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)			357.34	357.89	357.42	**357.55**
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)			441.55	442.58	442.31	**442.15**
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)			152.00	152.00	152.00	**152.00**
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)			356.38	357.78	358.02	**357.39**
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)			356.38	357.78	358.02	**357.39**
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)			424.46	426.39	426.71	**425.85**
Primary Air Temperature Entering	Deg F	*TMn8C*	107.00	107.00	107.00	**107.00**
Primary Air Temperature Leaving	Deg F	*TMn9A*	441.55	442.58	442.31	**442.15**
Secondary Air Temperature Entering	Deg F	*TMn8B*	152.00	152.00	152.00	**152.00**
Primary Air Flow	Klbm/hr	*Mr11*	337.56	338.95	338.54	**338.35**
Total Airflow	Klbm/hr		998.28	997.82	993.83	**996.64**
Flue Gas Temperatures and Flows						
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)			491.91	493.37	493.76	**493.02**
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)			426.94	431.73	428.66	**429.11**
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)			402.75	407.68	405.02	**405.15**
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)			307.24	308.72	309.98	**308.65**
Average Flue Gas Recirculation Temperature			367.49	368.55	369.32	**368.45**
Flue Gas Recirc Flow Rate	lbm/hr		187,405	185,309	186,277	**186,330.33**
Flue Gas Temperature Leaving Primary AH	Deg F	*TMn15*	307.24	308.72	309.98	**308.65**
Flue Gas Temperature Leaving Secondary AH	Deg F	*TMn15*	306.24	307.36	308.10	**307.23**
Total Gas Entering Air Heaters	Klbm/hr		1,279.99	1,279.36	1,273.87	**1,277.74**
Other Temperatures						
Reference Temperature	Deg F		77.00	77.00	77.00	**77.00**
Enthalpy of Water (32 F Reference)	BTU/lbm	*HWRe*	45.07	45.07	45.07	**45.07**
Fuel Temperature	Deg F		80.06	80.06	80.06	**80.06**
Mass Fractions						
Mass Fraction of Fixed Carbon		*MFrFc*	0.00	0.00	0.00	**0.00**
Mass Fraction of Volatile Matter			0.00	0.00	0.00	**0.00**
Mass Fraction of Moisture	-	*MFrW*	0.00	0.00	0.00	**0.00**
Mass Fraction of Ash	-	*MFrRs*	0.00	0.00	0.00	**0.00**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
Ammonia						
Aqueous ammonia to SCR (19% NH3)	lbm/hr		162.96	161.77	162.39	**162.38**
Aqueous Ammonia Pressure			30.00	30.00	30.00	**30.00**
Temperature of Aqueous Ammonia			74.66	75.32	70.07	**73.35**
Aqueous Ammonia Enthalpy			42.82	43.48	38.23	**41.51**
Primary Air Flow to NH3 Vaporizer	lbm/hr		500.33	499.96	499.93	**500.07**
Dry Air Flow to NH3	lbm/hr		489.07	488.71	488.68	**488.82**
Temperature of Air to Vaporizer			357.34	357.89	357.42	**357.55**
Enthalpy of Dry Air to Vaporizer			67.76	67.90	67.78	**67.81**
Enthalpy of Moisture in Air to Vaporizer			126.85	127.10	126.89	**126.95**
			126.85	127.10	126.89	**126.95**
Temperature of Air/Ammonia after Vaporizer before flue gas			212.55	212.55	212.55	**212.55**
Enthalpy of Dry Air After Vaporizer			32.62	32.62	32.62	**32.62**
Enthalpy of Moisture in Air After Vaporizer		*1105.43934*	1,150.62	1,150.62	1,150.62	**1,150.62**
Total Moisture	lbm/hr		174.22	173.02	173.64	**173.63**
Energy of Mixed Ammonia/Air	BTU/hr		216,411.78	215,023.62	215,737.39	**215,724.26**
MASS FRACTION CALCULATIONS						
Mass Fraction of Volatile Matter on Dry and Ash free		*MFrVm*	0.00	0.00	0.00	**0.00**
Mass Fraction of Volatile Matter 1		*MFrVm1*	0.00	0.00	0.00	**0.00**
Mass Fraction of Volatile Matter 2	-	*MFrVm2*	0.00	0.00	0.00	**0.00**
ENTHALPY CALCULATIONS						
Enthalpy of Dry Air	BTU/lbm	*HDAEn*	14.36	14.35	14.33	**14.35**
Enthalpy of Water Vapor	BTU/lbm	*HWvEn*	26.69	26.66	26.64	**26.67**
Enthalpy of Dry Gas	BTU/lbm	*HDFgLvCr*	54.93	55.25	55.49	**55.22**
Enthalpy of Steam @ 1 PSIA	BTU/lbm	*HStLvCr*	1,198.84	1,199.44	1,199.90	**1,199.39**
Enthalpy of Water Vapor	BTU/lbm	*HWvLvCr*	103.61	104.21	104.67	**104.17**
Enthalpy of Fuel	BTU/lbm	*HFEn*	1.84	1.84	1.84	**1.84**
Enthalpy of Fixed Carbon	BTU/lbm	*HFc*	0.56	0.56	0.56	**0.56**
Enthalpy of Volatile Matter 1	BTU/lbm	*HVm1*	1.26	1.26	1.26	**1.26**
Enthalpy of Volatile Matter 2	BTU/lbm	*HVm2*	2.22	2.22	2.22	**2.22**
Enthalpy of Moisture	BTU/lbm	*HW*	3.06	3.06	3.06	**3.06**
Enthalpy of Ash	BTU/lbm	*HRs*	0.56	0.56	0.56	**0.56**
Primary Air Entering Air Heater 1						
Enthalpy of Dry Air	BTU/lbm	*HDAEn8C*	7.20	7.20	7.20	**7.20**
Enthalpy of Water Vapor	BTU/lbm	*HWv8C*	13.37	13.37	13.37	**13.37**
Enthalpy of Wet Air	BTU/lbm	*HA8C*	7.34	7.34	7.34	**7.34**
Primary Air Entering Air Heater 2						
Enthalpy of Dry Air			67.76	67.90	67.78	**67.81**
Enthalpy of Water Vapor			1,219.87	1,220.13	1,219.90	**1,219.97**
Enthalpy of Wet Air			93.12	93.25	93.13	**93.17**
Primary Air Leaving Air Heater 2						
Enthalpy of Dry Air	BTU/lbm	*HDAEn9A*	88.40	88.66	88.59	**88.55**
Enthalpy of Water Vapor	BTU/lbm	*HWv9A*	1,259.63	1,260.12	1,260.00	**1,259.92**
Enthalpy of Wet Air	BTU/lbm	*HA9A*	114.18	114.44	114.37	**114.33**
Flue Gas Entering PA AH 2 and SA AH 3						
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgEn*	326.78	327.13	326.94	**326.95**
Enthalpy of Dry Gas Leaving	BTU/lbm		100.53	100.90	100.99	**100.81**
Enthalpy of Moisture in Gas	BTU/lbm		1,283.53	1,284.22	1,284.41	**1,284.05**
Enthalpy of Moisture in Refuse	BTU/lbm		89.11	89.46	89.56	**89.38**
Flue Gas Leaving PA AH 2 and SA AH 3						
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	307.50	308.83	307.62	**307.98**
Enthalpy of Dry Gas Leaving	BTU/lbm		84.39	85.57	84.81	**84.92**
Enthalpy of Moisture in Gas	BTU/lbm		1,252.72	1,254.99	1,253.53	**1,253.75**
Enthalpy of Moisture in Refuse	BTU/lbm		73.66	74.78	74.06	**74.17**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
Flue Gas Entering PA AH 1 and SA AH 2						
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	298.79	300.11	299.06	**299.32**
Enthalpy of Dry Gas Leaving	BTU/lbm		78.42	79.63	78.98	**79.01**
Enthalpy of Moisture in Gas	BTU/lbm		1,241.29	1,243.62	1,242.37	**1,242.43**
Flue Gas Leaving PA AH 1 and SA AH 1						
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	271.30	271.62	271.71	**271.55**
Enthalpy of Dry Gas Leaving	BTU/lbm		55.05	55.41	55.71	**55.39**
Enthalpy of Moisture in Gas	BTU/lbm		1,196.19	1,196.89	1,197.49	**1,196.86**
Flue Gas Recirculation						
Enthalpy of Wet Flue Gas	BTU/lbm	*HFgLv*	288.61	288.81	288.76	**288.73**
Enthalpy of Dry Gas Leaving	BTU/lbm		69.75	70.01	70.20	**69.99**
Enthalpy of Moisture in Gas	BTU/lbm		1,224.66	1,225.16	1,225.52	**1,225.11**
AUX POWER AND RADIATION LOSSES						
Auxiliary Equipment Power	mmBTU/h	*QrBX*	0.00	0.00	0.00	**0.00**
Auxiliary Equipment Power	%	*QpBX*	0.00	0.00	0.00	**0.00**
Loss Due to Surface Radiation	%	*QpLSrc*	0.20	0.20	0.20	**0.20**
CALCULATED ENTERING AIR (PRIMARY AND SECONDARY) FLOW AND TEMPERATURE						
Pulverizer Tempering Airflow	Klbm/hr	*MrA5*	0.00	0.00	0.00	**0.00**
Secondary Airflow	Klbm/hr	*Mr8B*	660.72	658.86	655.29	**658.29**
Average Temperature Entering Air Heater	Deg F	*TMnAEn*	136.78	136.71	136.67	**136.72**
Average Entering Air Temperature	Deg F	*TMnAEn*	136.78	136.71	136.67	**136.72**
CALCULATED FLUE GAS FLOW AND TEMPERATURE						
Flue Gas Flow Entering Primary AH	Klbm/hr		650.04	653.98	656.07	**653.37**
Flue Gas Flow Entering Secondary AH	Klbm/hr		629.95	625.38	617.80	**624.38**
Average Exit Gas Temperature	Deg F	*TFgLvCr*	306.75	308.05	309.07	**307.96**
Average Exit Gas Temperature (Excluding Leakage)	Deg F	*TFgLvCr*	306.75	308.05	309.07	**307.96**
STANDARD LOSS CALCULATIONS						
LOSSES, %						
Dry Gas - PA AH 2 Outlet	%	*QpLDfg*	7.26	7.35	7.29	**7.30**
Wet Air to Ammonia Vaporizer and Hydrous Ammonia	%		0.02	0.02	0.02	**0.02**
Dry Gas - PA AH 1 Outlet	%		5.03	5.05	5.08	**5.05**
Bottom Ash Cooling			0.13	0.12	0.12	**0.12**
Water from H2 Fuel	%	*QpLH2F*	7.28	7.28	7.29	**7.28**
Water from H2O Fuel	%	*QpLWF*	10.89	10.89	10.90	**10.89**
Water from H2Ov Fuel	%	*QpLWvF*	0.00	0.00	0.00	**0.00**
Moisture in Air	%	*QpLWA*	0.19	0.19	0.19	**0.19**
Unburned Carbon in Residue	%	*QpLUbC*	0.16	0.14	0.11	**0.14**
Hot Air Quality Control Equipment	%	*QpLAq*	0.00	0.00	0.00	**0.00**
Additional Moisture from Flue Gas Recirc	%		3.37	3.33	3.36	**3.35**
CREDITS, %						
Entering Dry Gas - PA AH 1 Inlet			7.16	7.26	7.20	**7.21**
Hydrous Ammonia			0.02	0.02	0.02	**0.02**
Entering Wet Gas - Flue Gas Recirculation			4.48	4.43	4.48	**4.46**
Entering Dry Air	%	*QpBDA*	1.16	1.16	1.16	**1.16**
Moisture in Air	%	*QpBWA*	0.05	0.05	0.05	**0.05**
Sensible Heat in Fuel	%	*QpBF*	0.04	0.04	0.04	**0.04**
Sensible Heat from Sorbent	mmBTU/hr		-0.01	-0.01	-0.04	**-0.02**
Steam Coil Air Heater			1.15	1.23	1.19	**1.19**

BOILER EFFICIENCY CALCULATIONS

DESCRIPTION	UNITS	SYMBOL	Corrected Test Run 1 11/21/2013 10:00 14:00	Corrected Test Run 2 11/21/2013 14:00 18:00	Corrected Test Run 3 11/21/2013 18:00 22:00	Corrected TEST RUN AVERAGE
OTHER LOSSES AND CREDITS						
Sodium Bicarbonate Credit						
Sodium Bicarbonate Flow	lb/hr		120.00	120.00	120.00	**120.00**
Latent Energy from NaHCO3 and HCl	BTU/lb	Hf	**125.41**	**125.41**	**125.41**	**125.41**
Latent Energy from NaHCO3 and HF	BTU/lb	Hf	**131.37**	**131.37**	**131.37**	**131.37**
Percent of NaHCO3 Reacted with HCl	%		10.00	10.00	10.00	**10.00**
Percent of NaHCO3 Reacted with HF	%		10.00	10.00	10.00	**10.00**
Specific Heat of Sodium Bicarbonate	BTU/lb-F	Cp	**0.25**	**0.25**	**0.25**	**0.25**
Total Latent Heat from NaHCO3	mmBTU/hr		0.0031	0.0031	0.0031	**0.00**
Sensible Heat of Sodium Bicarbonate	mmBTU/hr		0.0001	0.0001	0.0001	**0.00**
Total NaHCO3 Credit	mmBTU/hr		0.0032	0.0032	0.0032	**0.00**

APPENDIX D

Uncertainty Calculations

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Power Output			101,325
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 1	0												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0004	1.9650	0.0007	0.0033	-5.25E+00	-0.0171	-0.0039	0.0175
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.09E+03	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	2.8071	2.8191	0.1199	1.9650	0.2356	2.8290	-4.02E+00	-11.3255	-0.9463	11.3650
Ambient Wet Bulb Temperature	70		0.2600	1.3854	1.4096	0.1121	1.9650	0.2203	1.4267	-3.33E+01	-46.9545	-7.3383	47.5245
Cooling Tower Wet Bulb Temperature	68		0.2600	0.6163	0.6689	0.1013	1.9649	0.1990	0.6979	7.83E+01	52.3897	15.5841	54.6585
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0366	0.2033	0.0034	1.9649	0.0067	0.2034	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	492	Deg F	2.2410	6.2563	6.6456	0.0505	1.9655	0.0993	6.6463	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	66	Deg F	2.0000	0.0000	2.0000	0.2142	1.9699	0.4219	2.0440	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	98	Deg F	2.0000	0.0000	2.0000	0.1865	1.9699	0.3673	2.0335	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	492	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	427		8.5388		8.5388			0.0000	8.5388	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	403		2.0000	0.0000	2.0000	0.0354	1.9699	0.0696	2.0012	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	308	Deg F	2.0000	0.3417	2.0290	0.0511	1.9687	0.1006	2.0315	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	108	Deg F	2.0000	0.0000	2.0000	0.0507	1.9699	0.0999	2.0025	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0678	1.9699	0.1336	2.1282	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0330	1.9699	0.0651	2.0011	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	424	Deg F	2.0115	0.0000	2.0115	0.0344	1.9699	0.0677	2.0126	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	367		2.0000	0.0000	2.0000	0.0562	1.9699	0.1107	2.0031	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2270	0.5491	0.0036	1.9649	0.0070	0.5491	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0044	0.3000	0.0050	1.9649	0.0097	0.3002	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0176	0.5003	0.0111	1.9649	0.0218	0.5008	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	30	ppm	5.0000	0.0329	5.0001	0.1820	1.9649	0.3577	5.0129	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-3.70E-05	-0.0001	0.0000	0.0001
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	415	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	492	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	308	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-8.69E-01	-0.2606	0.0000	0.2606
Carbon	30	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.20E+00	0.9586	0.0000	0.9586
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	8	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	8	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	8	wt %	0.7760	0.0000	0.7760	0.0000	0.0000	0.0000	0.7760	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0490	0.0000	0.0490	0.0000	0.0000	0.0000	0.0490	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0130	0.0000	0.0130	0.0000	0.0000	0.0000	0.0130	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,493	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PA Fans	1,018	kW	10.1750	0.0000	10.1750	0.0000	0.0000	0.0000	10.1750	0.00E+00	0.0000	0.0000	0.0000
SA Fans	261	kW	2.6090	0.0000	2.6090	0.0000	0.0000	0.0000	2.6090	0.00E+00	0.0000	0.0000	0.0000
ID Fan	2,753	kW	27.5250	0.0000	27.5250	0.0000	0.0000	0.0000	27.5250	0.00E+00	0.0000	0.0000	0.0000
Recirc Fan	776	kW	7.7630	0.0000	7.7630	0.0000	0.0000	0.0000	7.7630	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	163	lb/hr	8.1480	0.0000	8.1480	0.0627	1.9699	0.1234	8.1489	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	25.0165	0.0000	25.0165	0.1701	1.9699	0.3350	25.0187	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	187,405	lbm/hr	9370.2606	0.0000	9370.2606	157.2757	1.9699	309.8236	9375.3813	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Power Output			101,325
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	284,643	lbm/h	14,232.13	0.00	14,232.13	191.53	1.97	377.29	14,237.13	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	557,136	lbm/h	27,856.81	0.00	27,856.81	586.66	1.96	1,150.80	27,880.57	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	135	gpm	6.7708	8.0664	10.5315	0.9000	2.2010	1.9809	10.7161	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,352	psia	1.9500	0.0000	1.9500	0.2155	1.9650	0.4235	1.9955	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0049	1.9650	0.0096	0.5501	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Pressure	1,750	psia	10.0000	0.0000	10.0000	0.3503	1.9699	0.6900	10.0238	0.00E+00	0.0000	0.0000	0.0000
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0078	1.9699	0.0153	2.5000	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0094		0.0094	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3079	1.9650	0.6051	1.4339	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Temperature	998	Deg F	0.5500		0.5500	0.0789	1.9650	0.1550	0.5714	0.00E+00	0.0000	0.0000	0.0000
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0014	1.9650	0.0028	0.0043	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0050	1.9699	0.0098	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	89	Deg F	2.0000	0.0000	2.0000	0.1123	1.9699	0.2212	2.0122	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	27.2091	27.2825	0.4513	12.7062	5.7348	27.8787	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0252	1.9650	0.0496	0.0817	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0153	1.9699	0.0302	2.5002	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0238	1.9699	0.0468	2.0005	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,418	psia	12.5000	0.0000	12.5000	0.2365	1.9699	0.4659	12.5087	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0225	1.9699	0.0444	2.0005	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0058	1.9699	0.0114	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	385	psia	2.5000	0.0000	2.5000	0.0312	1.9699	0.0615	2.5008	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	371	psia	2.5000	0.0000	2.5000	0.0319	1.9699	0.0628	2.5008	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0011	1.9699	0.0021	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	105	Deg F	2.0000	0.0000	2.0000	0.0741	1.9699	0.1460	2.0053	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	27	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	98	Deg F	2.0000	0.0000	2.0000	0.1865		0.1865	2.0087	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	108	Deg F	2.0000	0.0000	2.0000	0.0507		0.0507	2.0006	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	66	Deg F	2.0000	0.0000	2.0000	0.2142		0.2142	2.0114	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0330		0.0330	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,617	kW	492.8515	0.0000	492.8515	31.9827	1.9699	63.0040	496.8622	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,740	kW	50.4812	0.0000	50.4812	7.3090	1.9699	14.3983	52.4944	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,884	kW	442.4030	0.0000	442.4030	29.8092	1.9699	58.7224	446.2832	9.95E-01	440.3550	58.4505	444.2173
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	485	kW	2.0870	0.0000	2.0870	2.1086	1.9649	4.1432	4.6391	1.00E+00	2.0870	4.1432	4.6391
Manual Auxiliary Loads	200	kW	9.6081	0.0000	9.6081	0.0000	0.0000	0.0000	9.6081	1.00E+00	9.6081	0.0000	9.6081
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	878,824	lbm/hr	8788.2387		8788.2387			0.0000	8788.2387	0.00E+00	0.0000	0.0000	0.0000
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	446.193	61.084	
													0.00
										Pre-Test Total Corrected Output			450.35
										Uncertainty			0.44%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Heat Rate			11,858
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 1	0												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0004	1.9650	0.0007	0.0033	-1.58E+00	-0.0051	-0.0012	0.0053
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.45E+01	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	7.70E+02	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	2.8071	2.8191	0.1199	1.9650	0.2356	2.8290	7.46E-01	2.1040	0.1758	2.1114
Ambient Wet Bulb Temperature	70		0.2600	1.3854	1.4096	0.1121	1.9650	0.2203	1.4267	6.02E-01	0.8487	0.1326	0.8590
Cooling Tower Wet Bulb Temperature	68		0.2600	0.6163	0.6689	0.1013	1.9649	0.1990	0.6979	1.39E-06	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	-2.41E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0366	0.2033	0.0034	1.9649	0.0067	0.2034	6.65E+01	13.5214	0.4451	13.5287
Economizer Flue Gas Exit Temperature	492	Deg F	2.2410	6.2563	6.6456	0.0505	1.9655	0.0993	6.6463	1.08E-03	0.0072	0.0001	0.0072
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	66	Deg F	2.0000	0.0000	2.0000	0.2142	1.9699	0.4219	2.0440	1.21E-08	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	98	Deg F	2.0000	0.0000	2.0000	0.1865	1.9699	0.3673	2.0335	-9.26E-10	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	492	Deg F	0.0000		0.0000			0.0000	0.0000	-3.29E-03	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	427		8.5388		8.5388			0.0000	8.5388	3.26E+00	27.8153	0.0000	27.8153
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	403		2.0000	0.0000	2.0000	0.0354	1.9699	0.0696	2.0012	-3.45E+00	-6.8952	-0.2401	6.8994
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	308	Deg F	2.0000	0.3417	2.0290	0.0511	1.9687	0.1006	2.0315	4.76E+00	9.6610	0.4791	9.6729
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	108	Deg F	2.0000	0.0000	2.0000	0.0507	1.9699	0.0999	2.0025	1.21E+00	2.4122	0.1205	2.4152
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	-3.30E-07	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	1.31E-07	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0678	1.9699	0.1336	2.1282	1.43E-03	0.0030	0.0002	0.0031
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0330	1.9699	0.0651	2.0011	-1.89E+00	-3.7771	-0.1229	3.7791
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	-1.27E-06	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	3.13E-08	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	424	Deg F	2.0115	0.0000	2.0115	0.0344	1.9699	0.0677	2.0126	-1.01E-08	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	367		2.0000	0.0000	2.0000	0.0562	1.9699	0.1107	2.0031	-6.86E-01	-1.3710	-0.0759	1.3731
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	7.24E+01	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2270	0.5491	0.0036	1.9649	0.0070	0.5491	-8.41E-05	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0044	0.3000	0.0050	1.9649	0.0097	0.3002	-4.00E+01	-11.9962	-0.3891	12.0025
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0176	0.5003	0.0111	1.9649	0.0218	0.5008	2.97E-05	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	30	ppm	5.0000	0.0329	5.0001	0.1820	1.9649	0.3577	5.0129	-5.49E-07	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	1.94E-08	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	2.47E-08	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-1.65E+00	-3.2996	0.0000	3.2996
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	8.06E-07	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	5.40E-09	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	1.22E-03	0.0366	0.0000	0.0366
Fly Ash Temperature	415	Deg F			0.0000			0.0000	0.0000	1.84E-02	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	492	Deg F			0.0000			0.0000	0.0000	1.08E-03	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	308	Deg F			0.0000			0.0000	0.0000	3.95E-04	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.61E+01	10.8191	0.0000	10.8191
Carbon	30	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	2.47E+01	26.6793	0.0000	26.6793
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	3.72E+02	262.1692	0.0000	262.1692
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	6.80E+00	0.5333	0.0000	0.5333
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	1.34E+01	0.0790	0.0000	0.0790
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	3.53E+01	7.4957	0.0000	7.4957
Oxygen	25	wt %			0.0000			0.0000	0.0000	-7.65E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	-2.55E-06	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-3.10E+02	-92.8658	0.0000	92.8658
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	2.15E-06	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	1.10E+00	1.9366	0.0000	1.9366
Total Carbon	8	wt %			0.0000			0.0000	0.0000	-1.87E-05	0.0000	0.0000	0.0000
Organic Carbon Level	8	wt %			0.0000			0.0000	0.0000	5.26E-06	0.0000	0.0000	0.0000
Unburned Carbon	8	wt %	0.7760	0.0000	0.7760	0.0000	0.0000	0.0000	0.7760	1.18E+01	9.1235	0.0000	9.1235
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-1.49E-03	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	1.45E-01	0.0145	0.0000	0.0145
Total Carbon	0	wt %			0.0000			0.0000	0.0000	9.71E-05	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	-1.65E-05	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0490	0.0000	0.0490	0.0000	0.0000	0.0000	0.0490	9.35E-01	0.0458	0.0000	0.0458
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	3.54E-01	0.0354	0.0000	0.0354
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-5.50E-02	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	4.84E-04	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0130	0.0000	0.0130	0.0000	0.0000	0.0000	0.0130	6.68E-01	0.0087	0.0000	0.0087
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-1.12E-01	-0.0002	0.0000	0.0002
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	1.07E-01	0.0043	0.0000	0.0043
Unburned Carbon	0	%			0.0000			0.0000	0.0000	2.67E-01	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,493	kW			0.0000			0.0000	0.0000	-1.16E-07	0.0000	0.0000	0.0000
PA Fans	1,018	kW	10.1750	0.0000	10.1750	0.0000	0.0000	0.0000	10.1750	1.03E-08	0.0000	0.0000	0.0000
SA Fans	261	kW	2.6090	0.0000	2.6090	0.0000	0.0000	0.0000	2.6090	-1.13E-08	0.0000	0.0000	0.0000
ID Fan	2,753	kW	27.5250	0.0000	27.5250	0.0000	0.0000	0.0000	27.5250	3.82E-10	0.0000	0.0000	0.0000
Recirc Fan	776	kW	7.7630	0.0000	7.7630	0.0000	0.0000	0.0000	7.7630	-3.40E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	1.05E-09	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	163	lb/hr	8.1480	0.0000	8.1480	0.0627	1.9699	0.1234	8.1489	-1.33E-04	-0.0011	0.0000	0.0011
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	-7.88E-08	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	5.25E-09	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	25.0165	0.0000	25.0165	0.1701	1.9699	0.3350	25.0187	8.86E-04	0.0222	0.0003	0.0222
Flue Gas Recirc Flow Rate	187,405	lbm/hr	9370.2606	0.0000	9370.2606	157.2757	1.9699	309.8236	9375.3813	-3.39E-04	-3.1734	-0.1049	3.1751
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	2.89E-08	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Net Heat Rate			11,858
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	-3.02E-04	-0.0007	0.0000	0.0007
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	7.91E-11	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	1.42E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	-5.05E-06	0.0000	0.0000	0.0000
Primary Air Flow Rate	284,643	lbm/h	14,232.13	0.00	14,232.13	191.53	1.97	377.29	14,237.13	1.05E-04	1.4902	0.0395	1.4907
Secondary Air Flow Rate	557,136	lbm/h	27,856.81	0.00	27,856.81	586.66	1.96	1,150.80	27,880.57	-5.35E-05	-1.4902	-0.0616	1.4915
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	135	gpm	6.7708	8.0664	10.5315	0.9000	2.2010	1.9809	10.7161	1.38E-01	1.4579	0.2742	1.4835
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,352	psia	1.9500	0.0000	1.9500	0.2155	1.9650	0.4235	1.9955	2.94E-02	0.0574	0.0125	0.0587
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0049	1.9650	0.0096	0.5501	-1.61E+01	-8.8532	-0.1549	8.8546
Boiler Drum Pressure	1,750	psia	10.0000	0.0000	10.0000	0.3503	1.9699	0.6900	10.0238	-3.22E-05	-0.0003	0.0000	0.0003
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0078	1.9699	0.0153	2.5000	1.37E-07	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0094		0.0094	2.0000	1.72E-09	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3079	1.9650	0.6051	1.4339	-3.39E-01	-0.4411	-0.2053	0.4865
Boiler HP Steam Outlet Temperature	998	Deg F	0.5500		0.5500	0.0789	1.9650	0.1550	0.5714	6.56E+00	3.6093	1.0175	3.7499
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0014	1.9650	0.0028	0.0043	1.55E-04	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0050	1.9699	0.0098	2.5000	-1.15E-03	-0.0029	0.0000	0.0029
Bottom Ash Cooling Water Inlet Temperature	89	Deg F	2.0000	0.0000	2.0000	0.1123	1.9699	0.2212	2.0122	-8.51E-01	-1.7027	-0.1883	1.7131
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	2.18E-03	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	27.2091	27.2825	0.4513	12.7062	5.7348	27.8787	8.51E-01	23.2225	4.8813	23.7300
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	-6.68E-04	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	6.16E-09	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-3.82E+02	-3.8209	0.0000	3.8209
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	4.28E+03	42.8096	0.0000	42.8096
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0252	1.9650	0.0496	0.0817	8.89E+01	5.7809	4.4071	7.2692
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0153	1.9699	0.0302	2.5002	-7.60E-10	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0238	1.9699	0.0468	2.0005	-1.66E-11	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,418	psia	12.5000	0.0000	12.5000	0.2365	1.9699	0.4659	12.5087	-3.76E-14	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0225	1.9699	0.0444	2.0005	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0058	1.9699	0.0114	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	385	psia	2.5000	0.0000	2.5000	0.0312	1.9699	0.0615	2.5008	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	371	psia	2.5000	0.0000	2.5000	0.0319	1.9699	0.0628	2.5008	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0011	1.9699	0.0021	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	105	Deg F	2.0000	0.0000	2.0000	0.0741	1.9699	0.1460	2.0053	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-3.20E+00	-0.3201	0.0000	0.3201
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	3.20E+00	0.3201	0.0000	0.3201
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.74E-07	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.54E-08	0.0000	0.0000	0.0000
DI Start Level	27	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	9.15E-09	0.0000	0.0000	0.0000
DI End Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	6.09E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	98	Deg F	2.0000	0.0000	2.0000	0.1865		0.1865	2.0087	1.21E-11	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	108	Deg F	2.0000	0.0000	2.0000	0.0507		0.0507	2.0006	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	66	Deg F	2.0000	0.0000	2.0000	0.2142		0.2142	2.0114	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0330		0.0330	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,617	kW	492.8515	0.0000	492.8515	31.9827	1.9699	63.0040	496.8622	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,740	kW	50.4812	0.0000	50.4812	7.3090	1.9699	14.3983	52.4944	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,884	kW	442.4030	0.0000	442.4030	29.8092	1.9699	58.7224	446.2832	-1.10E-01	-48.8812	-6.4882	49.3099
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	485	kW	2.0870	0.0000	2.0870	2.1086	1.9649	4.1432	4.6391	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	200	kW	9.6081	0.0000	9.6081	0.0000	0.0000	0.0000	9.6081	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	878,824	lbm/hr	8788.2387		8788.2387			0.0000	8788.2387	1.30E-02	114.0972	0.0000	114.0972
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	312.325	9.343	
													-0.20
										Pre-Test Total Corrected Output			312.46
										Uncertainty			2.64%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Boiler Flow			870,046
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 1	0												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0004	1.9650	0.0007	0.0033	-1.76E-03	0.0000	0.0000	0.0000
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	2.8071	2.8191	0.1199	1.9650	0.2356	2.8290	0.00E+00	0.0000	0.0000	0.0000
Ambient Wet Bulb Temperature	70		0.2600	1.3854	1.4096	0.1121	1.9650	0.2203	1.4267	0.00E+00	0.0000	0.0000	0.0000
Cooling Tower Wet Bulb Temperature	68		0.2600	0.6163	0.6689	0.1013	1.9649	0.1990	0.6979	0.00E+00	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0366	0.2033	0.0034	1.9649	0.0067	0.2034	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	492	Deg F	2.2410	6.2563	6.6456	0.0505	1.9655	0.0993	6.6463	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	66	Deg F	2.0000	0.0000	2.0000	0.2142	1.9699	0.4219	2.0440	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	98	Deg F	2.0000	0.0000	2.0000	0.1865	1.9699	0.3673	2.0335	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	492	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	427		8.5388		8.5388			0.0000	8.5388	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	403		2.0000	0.0000	2.0000	0.0354	1.9699	0.0696	2.0012	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	308	Deg F	2.0000	0.3417	2.0290	0.0511	1.9687	0.1006	2.0315	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	108	Deg F	2.0000	0.0000	2.0000	0.0507	1.9699	0.0999	2.0025	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0678	1.9699	0.1336	2.1282	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0330	1.9699	0.0651	2.0011	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	424	Deg F	2.0115	0.0000	2.0115	0.0344	1.9699	0.0677	2.0126	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	367		2.0000	0.0000	2.0000	0.0562	1.9699	0.1107	2.0031	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2270	0.5491	0.0036	1.9649	0.0070	0.5491	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0044	0.3000	0.0050	1.9649	0.0097	0.3002	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0176	0.5003	0.0111	1.9649	0.0218	0.5008	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	30	ppm	5.0000	0.0329	5.0001	0.1820	1.9649	0.3577	5.0129	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	415	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	492	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	308	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Carbon	30	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	8	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	8	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	8	wt %	0.7760	0.0000	0.7760	0.0000	0.0000	0.0000	0.7760	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0490	0.0000	0.0490	0.0000	0.0000	0.0000	0.0490	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0130	0.0000	0.0130	0.0000	0.0000	0.0000	0.0130	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,493	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PA Fans	1,018	kW	10.1750	0.0000	10.1750	0.0000	0.0000	0.0000	10.1750	0.00E+00	0.0000	0.0000	0.0000
SA Fans	261	kW	2.6090	0.0000	2.6090	0.0000	0.0000	0.0000	2.6090	0.00E+00	0.0000	0.0000	0.0000
ID Fan	2,753	kW	27.5250	0.0000	27.5250	0.0000	0.0000	0.0000	27.5250	0.00E+00	0.0000	0.0000	0.0000
Recirc Fan	776	kW	7.7630	0.0000	7.7630	0.0000	0.0000	0.0000	7.7630	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	163	lb/hr	8.1480	0.0000	8.1480	0.0627	1.9699	0.1234	8.1489	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	25.0165	0.0000	25.0165	0.1701	1.9699	0.3350	25.0187	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	187,405	lbm/hr	9370.2606	0.0000	9370.2606	157.2757	1.9699	309.8236	9375.3813	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Boiler Flow			870,046
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	284,643	lbm/h	14,232.13	0.00	14,232.13	191.53	1.97	377.29	14,237.13	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	557,136	lbm/h	27,856.81	0.00	27,856.81	586.66	1.96	1,150.80	27,880.57	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	135	gpm	6.7708	8.0664	10.5315	0.9000	2.2010	1.9809	10.7161	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,352	psia	1.9500	0.0000	1.9500	0.2155	1.9650	0.4235	1.9955	2.97E+00	5.7860	1.2566	5.9209
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0049	1.9650	0.0096	0.5501	-3.41E+02	-187.6453	-3.2842	187.6741
Boiler Drum Pressure	1,750	psia	10.0000	0.0000	10.0000	0.3503	1.9699	0.6900	10.0238	-1.76E-03	-0.0176	-0.0012	0.0176
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0078	1.9699	0.0153	2.5000	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0094		0.0094	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3079	1.9650	0.6051	1.4339	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Temperature	998	Deg F	0.5500		0.5500	0.0789	1.9650	0.1550	0.5714	0.00E+00	0.0000	0.0000	0.0000
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0014	1.9650	0.0028	0.0043	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0050	1.9699	0.0098	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	89	Deg F	2.0000	0.0000	2.0000	0.1123	1.9699	0.2212	2.0122	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	27.2091	27.2825	0.4513	12.7062	5.7348	27.8787	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-2.91E+04	-291.2896	0.0000	291.2896
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	3.26E+05	3262.9460	0.0000	3262.9460
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0252	1.9650	0.0496	0.0817	6.78E+03	440.7999	336.0480	554.2858
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0153	1.9699	0.0302	2.5002	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0238	1.9699	0.0468	2.0005	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,418	psia	12.5000	0.0000	12.5000	0.2365	1.9699	0.4659	12.5087	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0225	1.9699	0.0444	2.0005	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0058	1.9699	0.0114	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	385	psia	2.5000	0.0000	2.5000	0.0312	1.9699	0.0615	2.5008	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	371	psia	2.5000	0.0000	2.5000	0.0319	1.9699	0.0628	2.5008	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0011	1.9699	0.0021	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	105	Deg F	2.0000	0.0000	2.0000	0.0741	1.9699	0.1460	2.0053	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.75E+02	-17.5178	0.0000	17.5178
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	1.75E+02	17.5181	0.0000	17.5181
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	27	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	98	Deg F	2.0000	0.0000	2.0000	0.1865		0.1865	2.0087	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	108	Deg F	2.0000	0.0000	2.0000	0.0507		0.0507	2.0006	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	66	Deg F	2.0000	0.0000	2.0000	0.2142		0.2142	2.0114	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0330		0.0330	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,617	kW	492.8515	0.0000	492.8515	31.9827	1.9699	63.0040	496.8622	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,740	kW	50.4812	0.0000	50.4812	7.3090	1.9699	14.3983	52.4944	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,884	kW	442.4030	0.0000	442.4030	29.8092	1.9699	58.7224	446.2832	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	485	kW	2.0870	0.0000	2.0870	2.1086	1.9649	4.1432	4.6391	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	200	kW	9.6081	0.0000	9.6081	0.0000	0.0000	0.0000	9.6081	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	878,824	lbm/hr	8788.2387		8788.2387			0.0000	8788.2387	9.90E-01	8700.3563	0.0000	8700.3563
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	9,309.03	336.066	
													-613.76
										Pre-Test Total Corrected Output			9,315.06
										Uncertainty			1.07%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Fuel Heat Input			1,206
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 1	0												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0004	1.9650	0.0007	0.0033	-1.61E-01	-0.0005	-0.0001	0.0005
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.49E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	7.92E+01	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	2.8071	2.8191	0.1199	1.9650	0.2356	2.8290	7.59E-02	0.2141	0.0179	0.2148
Ambient Wet Bulb Temperature	70		0.2600	1.3854	1.4096	0.1121	1.9650	0.2203	1.4267	6.19E-02	0.0873	0.0136	0.0884
Cooling Tower Wet Bulb Temperature	68		0.2600	0.6163	0.6689	0.1013	1.9649	0.1990	0.6979	1.43E-07	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	-2.45E-01	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0366	0.2033	0.0034	1.9649	0.0067	0.2034	6.84E+00	1.3911	0.0458	1.3919
Economizer Flue Gas Exit Temperature	492	Deg F	2.2410	6.2563	6.6456	0.0505	1.9655	0.0993	6.6463	1.11E-04	0.0007	0.0000	0.0007
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	66	Deg F	2.0000	0.0000	2.0000	0.2142	1.9699	0.4219	2.0440	1.25E-09	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	98	Deg F	2.0000	0.0000	2.0000	0.1865	1.9699	0.3673	2.0335	-9.52E-11	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	492	Deg F	0.0000		0.0000			0.0000	0.0000	-3.35E-04	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	427		8.5388		8.5388			0.0000	8.5388	3.31E-01	2.8301	0.0000	2.8301
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	403		2.0000	0.0000	2.0000	0.0354	1.9699	0.0696	2.0012	-3.51E-01	-0.7016	-0.0244	0.7020
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	308	Deg F	2.0000	0.3417	2.0290	0.0511	1.9687	0.1006	2.0315	4.90E-01	0.9940	0.0493	0.9952
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	108	Deg F	2.0000	0.0000	2.0000	0.0507	1.9699	0.0999	2.0025	1.23E-01	0.2454	0.0123	0.2457
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	-3.36E-08	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	1.33E-08	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0678	1.9699	0.1336	2.1282	1.46E-04	0.0003	0.0000	0.0003
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0330	1.9699	0.0651	2.0011	-1.94E-01	-0.3886	-0.0126	0.3888
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	-1.29E-07	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	3.18E-09	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	424	Deg F	2.0115	0.0000	2.0115	0.0344	1.9699	0.0677	2.0126	-1.03E-09	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	367		2.0000	0.0000	2.0000	0.0562	1.9699	0.1107	2.0031	-6.97E-02	-0.1395	-0.0077	0.1397
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	7.36E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2270	0.5491	0.0036	1.9649	0.0070	0.5491	-8.56E-06	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0044	0.3000	0.0050	1.9649	0.0097	0.3002	-4.07E+00	-1.2206	-0.0396	1.2212
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0176	0.5003	0.0111	1.9649	0.0218	0.5008	3.03E-06	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	30	ppm	5.0000	0.0329	5.0001	0.1820	1.9649	0.3577	5.0129	-5.59E-08	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	1.98E-09	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	2.52E-09	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-1.70E-01	-0.3395	0.0000	0.3395
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	8.29E-08	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	5.56E-10	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	1.26E-04	0.0038	0.0000	0.0038
Fly Ash Temperature	415	Deg F			0.0000			0.0000	0.0000	1.89E-03	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	492	Deg F			0.0000			0.0000	0.0000	1.11E-04	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	308	Deg F			0.0000			0.0000	0.0000	4.06E-05	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.71E+00	1.1131	0.0000	1.1131
Carbon	30	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	2.55E+00	2.7449	0.0000	2.7449
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	3.78E+01	26.6751	0.0000	26.6751
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	7.00E-01	0.0549	0.0000	0.0549
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	1.38E+00	0.0081	0.0000	0.0081
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	3.64E+00	0.7712	0.0000	0.7712
Oxygen	25	wt %			0.0000			0.0000	0.0000	-7.78E-01	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	-2.60E-07	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-3.15E+01	-9.4489	0.0000	9.4489
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	2.19E-07	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	1.13E-01	0.1992	0.0000	0.1992
Total Carbon	8	wt %			0.0000			0.0000	0.0000	-1.91E-06	0.0000	0.0000	0.0000
Organic Carbon Level	8	wt %			0.0000			0.0000	0.0000	5.35E-07	0.0000	0.0000	0.0000
Unburned Carbon	8	wt %	0.7760	0.0000	0.7760	0.0000	0.0000	0.0000	0.7760	1.21E+00	0.9387	0.0000	0.9387
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-1.51E-04	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	1.50E-02	0.0015	0.0000	0.0015
Total Carbon	0	wt %			0.0000			0.0000	0.0000	9.99E-06	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	-1.68E-06	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0490	0.0000	0.0490	0.0000	0.0000	0.0000	0.0490	9.62E-02	0.0047	0.0000	0.0047
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	3.64E-02	0.0036	0.0000	0.0036
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-5.59E-03	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	4.92E-05	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0130	0.0000	0.0130	0.0000	0.0000	0.0000	0.0130	6.87E-02	0.0009	0.0000	0.0009
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-1.14E-02	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	1.10E-02	0.0004	0.0000	0.0004
Unburned Carbon	0	%			0.0000			0.0000	0.0000	2.75E-02	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,493	kW			0.0000			0.0000	0.0000	-1.18E-08	0.0000	0.0000	0.0000
PA Fans	1,018	kW	10.1750	0.0000	10.1750	0.0000	0.0000	0.0000	10.1750	1.05E-09	0.0000	0.0000	0.0000
SA Fans	261	kW	2.6090	0.0000	2.6090	0.0000	0.0000	0.0000	2.6090	-1.15E-09	0.0000	0.0000	0.0000
ID Fan	2,753	kW	27.5250	0.0000	27.5250	0.0000	0.0000	0.0000	27.5250	3.89E-11	0.0000	0.0000	0.0000
Recirc Fan	776	kW	7.7630	0.0000	7.7630	0.0000	0.0000	0.0000	7.7630	-3.46E-11	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	1.07E-10	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	163	lb/hr	8.1480	0.0000	8.1480	0.0627	1.9699	0.1234	8.1489	-1.37E-05	-0.0001	0.0000	0.0001
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	-8.11E-09	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	5.41E-10	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	25.0165	0.0000	25.0165	0.1701	1.9699	0.3350	25.0187	9.12E-05	0.0023	0.0000	0.0023
Flue Gas Recirc Flow Rate	187,405	lbm/hr	9370.2606	0.0000	9370.2606	157.2757	1.9699	309.8236	9375.3813	-3.45E-05	-0.3229	-0.0107	0.3231
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	2.94E-09	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Fuel Heat Input			1,206
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	-3.10E-05	-0.0001	0.0000	0.0001
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	8.14E-12	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	1.44E-01	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	-5.14E-07	0.0000	0.0000	0.0000
Primary Air Flow Rate	284,643	lbm/h	14,232.13	0.00	14,232.13	191.53	1.97	377.29	14,237.13	1.08E-05	0.1533	0.0041	0.1534
Secondary Air Flow Rate	557,136	lbm/h	27,856.81	0.00	27,856.81	586.66	1.96	1,150.80	27,880.57	-5.50E-06	-0.1533	-0.0063	0.1534
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	135	gpm	6.7708	8.0664	10.5315	0.9000	2.2010	1.9809	10.7161	1.42E-02	0.1500	0.0282	0.1526
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,352	psia	1.9500	0.0000	1.9500	0.2155	1.9650	0.4235	1.9955	3.03E-03	0.0059	0.0013	0.0060
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0049	1.9650	0.0096	0.5501	-1.66E+00	-0.9109	-0.0159	0.9110
Boiler Drum Pressure	1,750	psia	10.0000	0.0000	10.0000	0.3503	1.9699	0.6900	10.0238	-3.32E-06	0.0000	0.0000	0.0000
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0078	1.9699	0.0153	2.5000	1.41E-08	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0094		0.0094	2.0000	1.77E-10	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3079	1.9650	0.6051	1.4339	-3.49E-02	-0.0454	-0.0211	0.0501
Boiler HP Steam Outlet Temperature	998	Deg F	0.5500		0.5500	0.0789	1.9650	0.1550	0.5714	6.75E-01	0.3713	0.1047	0.3858
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0014	1.9650	0.0028	0.0043	1.60E-05	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0050	1.9699	0.0098	2.5000	-1.17E-04	-0.0003	0.0000	0.0003
Bottom Ash Cooling Water Inlet Temperature	89	Deg F	2.0000	0.0000	2.0000	0.1123	1.9699	0.2212	2.0122	-8.66E-02	-0.1732	-0.0192	0.1743
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	2.24E-04	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	27.2091	27.2825	0.4513	12.7062	5.7348	27.8787	8.66E-02	2.3628	0.4967	2.4145
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	-6.80E-05	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	6.27E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-3.93E+01	-0.3931	0.0000	0.3931
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	4.40E+02	4.4044	0.0000	4.4044
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0252	1.9650	0.0496	0.0817	9.15E+00	0.5948	0.4534	0.7479
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0153	1.9699	0.0302	2.5002	-7.82E-11	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0238	1.9699	0.0468	2.0005	-1.71E-12	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,418	psia	12.5000	0.0000	12.5000	0.2365	1.9699	0.4659	12.5087	-4.70E-15	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0225	1.9699	0.0444	2.0005	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0058	1.9699	0.0114	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	385	psia	2.5000	0.0000	2.5000	0.0312	1.9699	0.0615	2.5008	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	371	psia	2.5000	0.0000	2.5000	0.0319	1.9699	0.0628	2.5008	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0011	1.9699	0.0021	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	105	Deg F	2.0000	0.0000	2.0000	0.0741	1.9699	0.1460	2.0053	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-3.29E-01	-0.0329	0.0000	0.0329
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	3.29E-01	0.0329	0.0000	0.0329
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.79E-08	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.58E-09	0.0000	0.0000	0.0000
DI Start Level	27	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	9.42E-10	0.0000	0.0000	0.0000
DI End Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	6.27E-11	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	98	Deg F	2.0000	0.0000	2.0000	0.1865		0.1865	2.0087	1.16E-12	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	108	Deg F	2.0000	0.0000	2.0000	0.0507		0.0507	2.0006	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	66	Deg F	2.0000	0.0000	2.0000	0.2142		0.2142	2.0114	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0330		0.0330	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,617	kW	492.8515	0.0000	492.8515	31.9827	1.9699	63.0040	496.8622	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,740	kW	50.4812	0.0000	50.4812	7.3090	1.9699	14.3983	52.4944	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,884	kW	442.4030	0.0000	442.4030	29.8092	1.9699	58.7224	446.2832	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	485	kW	2.0870	0.0000	2.0870	2.1086	1.9649	4.1432	4.6391	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	200	kW	9.6081	0.0000	9.6081	0.0000	0.0000	0.0000	9.6081	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	878,824	lbm/hr	8788.2387		8788.2387			0.0000	8788.2387	1.34E-03	11.7388	0.0000	11.7388
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	31.447	0.688	
													0.00
										Pre-Test Total Corrected Output			31.45
										Uncertainty			2.61%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Auxiliary Load			5,089
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 1	0												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0004	1.9650	0.0007	0.0033	5.79E-06	0.0000	0.0000	0.0000
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	2.8071	2.8191	0.1199	1.9650	0.2356	2.8290	0.00E+00	0.0000	0.0000	0.0000
Ambient Wet Bulb Temperature	70		0.2600	1.3854	1.4096	0.1121	1.9650	0.2203	1.4267	0.00E+00	0.0000	0.0000	0.0000
Cooling Tower Wet Bulb Temperature	68		0.2600	0.6163	0.6689	0.1013	1.9649	0.1990	0.6979	0.00E+00	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0366	0.2033	0.0034	1.9649	0.0067	0.2034	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	492	Deg F	2.2410	6.2563	6.6456	0.0505	1.9655	0.0993	6.6463	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	66	Deg F	2.0000	0.0000	2.0000	0.2142	1.9699	0.4219	2.0440	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	98	Deg F	2.0000	0.0000	2.0000	0.1865	1.9699	0.3673	2.0335	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	492	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	427		8.5388		8.5388			0.0000	8.5388	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	403		2.0000	0.0000	2.0000	0.0354	1.9699	0.0696	2.0012	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	308	Deg F	2.0000	0.3417	2.0290	0.0511	1.9687	0.1006	2.0315	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	108	Deg F	2.0000	0.0000	2.0000	0.0507	1.9699	0.0999	2.0025	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0678	1.9699	0.1336	2.1282	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0330	1.9699	0.0651	2.0011	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	356		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	424	Deg F	2.0115	0.0000	2.0115	0.0344	1.9699	0.0677	2.0126	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	367		2.0000	0.0000	2.0000	0.0562	1.9699	0.1107	2.0031	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2270	0.5491	0.0036	1.9649	0.0070	0.5491	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0044	0.3000	0.0050	1.9649	0.0097	0.3002	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0176	0.5003	0.0111	1.9649	0.0218	0.5008	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	30	ppm	5.0000	0.0329	5.0001	0.1820	1.9649	0.3577	5.0129	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	415	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	492	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	308	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	6.91E+01	20.7356	0.0000	20.7356
Carbon	30	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	8	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	8	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	8	wt %	0.7760	0.0000	0.7760	0.0000	0.0000	0.0000	0.7760	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0490	0.0000	0.0490	0.0000	0.0000	0.0000	0.0490	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0130	0.0000	0.0130	0.0000	0.0000	0.0000	0.0130	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,493	kW			0.0000			0.0000	0.0000	9.26E-01	0.0000	0.0000	0.0000
PA Fans	1,018	kW	10.1750	0.0000	10.1750	0.0000	0.0000	0.0000	10.1750	9.26E-01	9.4258	0.0000	9.4258
SA Fans	261	kW	2.6090	0.0000	2.6090	0.0000	0.0000	0.0000	2.6090	9.26E-01	2.4169	0.0000	2.4169
ID Fan	2,753	kW	27.5250	0.0000	27.5250	0.0000	0.0000	0.0000	27.5250	9.26E-01	25.4983	0.0000	25.4983
Recirc Fan	776	kW	7.7630	0.0000	7.7630	0.0000	0.0000	0.0000	7.7630	9.26E-01	7.1914	0.0000	7.1914
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	163	lb/hr	8.1480	0.0000	8.1480	0.0627	1.9699	0.1234	8.1489	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	25.0165	0.0000	25.0165	0.1701	1.9699	0.3350	25.0187	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	187,405	lbm/hr	9370.2606	0.0000	9370.2606	157.2757	1.9699	309.8236	9375.3813	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget: Test Value Mean, $\bar{X}$	Units	Systematic: B_{inst} Instrument Systematic Uncertainty	Systematic: $B_{spatial}$ Spatial Systematic Uncertainty	Systematic: $U_{95,SYS}$ Overall Systematic Uncertainty	Random: $S_{\bar{X}}$ Standard Deviation of the Mean	Random: $t_{95,\nu}$ Student's t	Random: $U_{95,RAND}$ Random Uncertainty	Total: $U_{95,TOT}$ Total Measurement Uncertainty	Uncertainty of Test Results: Corrected Auxiliary Load 5,089 — θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	284,643	lbm/h	14,232.13	0.00	14,232.13	191.53	1.97	377.29	14,237.13	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	557,136	lbm/h	27,856.81	0.00	27,856.81	586.66	1.96	1,150.80	27,880.57	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	135	gpm	6.7708	8.0664	10.5315	0.9000	2.2010	1.9809	10.7161	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,352	psia	1.9500	0.0000	1.9500	0.2155	1.9650	0.4235	1.9955	-5.30E-03	-0.0103	-0.0022	0.0106
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0049	1.9650	0.0096	0.5501	2.90E+00	1.5946	0.0279	1.5949
Boiler Drum Pressure	1,750	psia	10.0000	0.0000	10.0000	0.3503	1.9699	0.6900	10.0238	5.79E-06	0.0001	0.0000	0.0001
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0078	1.9699	0.0153	2.5000	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0094		0.0094	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3079	1.9650	0.6051	1.4339	6.11E-02	0.0794	0.0370	0.0876
Boiler HP Steam Outlet Temperature	998	Deg F	0.5500		0.5500	0.0789	1.9650	0.1550	0.5714	-1.18E+00	-0.6501	-0.1833	0.6754
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0014	1.9650	0.0028	0.0043	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0050	1.9699	0.0098	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	89	Deg F	2.0000	0.0000	2.0000	0.1123	1.9699	0.2212	2.0122	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	27.2091	27.2825	0.4513	12.7062	5.7348	27.8787	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	6.88E+01	0.6881	0.0000	0.6881
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	-7.71E+02	-7.7077	0.0000	7.7077
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0252	1.9650	0.0496	0.0817	-1.60E+01	-1.0413	-0.7938	1.3093
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0153	1.9699	0.0302	2.5002	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0238	1.9699	0.0468	2.0005	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,418	psia	12.5000	0.0000	12.5000	0.2365	1.9699	0.4659	12.5087	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0225	1.9699	0.0444	2.0005	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0058	1.9699	0.0114	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	385	psia	2.5000	0.0000	2.5000	0.0312	1.9699	0.0615	2.5008	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	371	psia	2.5000	0.0000	2.5000	0.0319	1.9699	0.0628	2.5008	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0011	1.9699	0.0021	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	105	Deg F	2.0000	0.0000	2.0000	0.0741	1.9699	0.1460	2.0053	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	5.77E-01	0.0577	0.0000	0.0577
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-5.77E-01	-0.0577	0.0000	0.0577
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	27	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	98	Deg F	2.0000	0.0000	2.0000	0.1865		0.1865	2.0087	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	108	Deg F	2.0000	0.0000	2.0000	0.0507		0.0507	2.0006	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	66	Deg F	2.0000	0.0000	2.0000	0.2142		0.2142	2.0114	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0330		0.0330	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,617	kW	492.8515	0.0000	492.8515	31.9827	1.9699	63.0040	496.8622	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,740	kW	50.4812	0.0000	50.4812	7.3090	1.9699	14.3983	52.4944	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,884	kW	442.4030	0.0000	442.4030	29.8092	1.9699	58.7224	446.2832	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	485	kW	2.0870	0.0000	2.0870	2.1086	1.9649	4.1432	4.6391	9.26E-01	1.9333	3.8381	4.2975
Manual Auxiliary Loads	200	kW	9.6081	0.0000	9.6081	0.0000	0.0000	0.0000	9.6081	9.26E-01	8.9006	0.0000	8.9006
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	878,824	lbm/hr	8788.2387		8788.2387			0.0000	8788.2387	-2.34E-03	-20.5519	0.0000	20.5519
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	42.377	3.924	
													1,186.56
										Pre-Test Total Corrected Output			54.75
										Uncertainty			1.08%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Net Power Output 101,431			
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,v}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 2	1												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0003	0.0033	-4.83E+00	-0.0157	-0.0015	0.0158
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.24E+03	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	1.6984	1.7182	0.0758	1.9649	0.1489	1.7247	-4.16E+00	-7.1550	-0.6203	7.1818
Ambient Wet Bulb Temperature	71		0.2600	0.7781	0.8204	0.0697	1.9649	0.1369	0.8317	-2.64E+01	-21.6189	-3.6073	21.9178
Cooling Tower Wet Bulb Temperature	70		0.2600	1.0368	1.0689	0.0552	1.9649	0.1085	1.0744	7.82E+01	83.5696	8.4826	83.9990
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0397	0.2039	0.0036	1.9649	0.0071	0.2040	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	493	Deg F	2.2410	6.8532	7.2103	0.0376	1.9649	0.0740	7.2107	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	68	Deg F	2.0000	0.0000	2.0000	0.1085	1.9699	0.2137	2.0114	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	99	Deg F	2.0000	0.0000	2.0000	0.0891	1.9699	0.1755	2.0077	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	493	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	432		8.6346		8.6346			0.0000	8.6346	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	408		2.0000	0.0000	2.0000	0.1221	1.9699	0.2404	2.0144	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	309	Deg F	2.0000	0.3544	2.0312	0.0134	1.9649	0.0263	2.0313	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	107	Deg F	2.0000	0.0000	2.0000	0.0593	1.9699	0.1168	2.0034	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	443	Deg F	2.1240	0.0000	2.1240	0.0149	1.9699	0.0293	2.1242	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0335	1.9699	0.0659	2.0011	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	426	Deg F	2.0115	0.0000	2.0115	0.0468	1.9699	0.0922	2.0136	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0136	1.9699	0.0267	2.0002	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2476	0.5580	0.0039	1.9649	0.0077	0.5580	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0045	0.3000	0.0084	1.9649	0.0166	0.3005	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0187	0.5004	0.0052	1.9649	0.0102	0.5005	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	27	ppm	5.0000	0.0306	5.0001	0.1677	1.9649	0.3296	5.0109	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-3.70E-05	-0.0001	0.0000	0.0001
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	420	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	493	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	309	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	37	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-8.72E-01	-0.2615	0.0000	0.2615
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.21E+00	0.9619	0.0000	0.9619
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	7	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	7	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	7	wt %	0.6865	0.0000	0.6865	2.1650	12.7062	27.5089	27.5175	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	1	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	1	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	1	wt %	0.0520	0.0000	0.0520	0.0700	12.7062	0.8894	0.8910	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0090	0.0000	0.0090	0.0700	12.7062	0.8894	0.8895	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	1	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,501	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PA Fans	1,021	kW	10.2100	0.0000	10.2100	0.0000	0.0000	0.0000	10.2100	0.00E+00	0.0000	0.0000	0.0000
SA Fans	260	kW	2.5960	0.0000	2.5960	0.0000	0.0000	0.0000	2.5960	0.00E+00	0.0000	0.0000	0.0000
ID Fan	2,746	kW	27.4630	0.0000	27.4630	0.0000	0.0000	0.0000	27.4630	0.00E+00	0.0000	0.0000	0.0000
Recirc Fan	783	kW	7.8250	0.0000	7.8250	0.0000	0.0000	0.0000	7.8250	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.0886	0.0000	8.0886	0.0589	1.9699	0.1161	8.0894	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9982	0.0000	24.9982	0.1901	1.9699	0.3744	25.0010	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	185,309	lbm/hr	9265.4404	0.0000	9265.4404	82.1429	1.9699	161.8165	9266.8533	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Power Output			101,431
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	287,139	lbm/h	14,356.96	0.00	14,356.96	165.81	1.97	326.64	14,360.67	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	558,141	lbm/h	27,907.05	0.00	27,907.05	601.57	1.96	1,180.04	27,931.99	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9867	8.2972	10.8469	0.4194	2.1448	0.8995	10.8842	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,351	psia	1.9500	0.0000	1.9500	0.2198	1.9649	0.4319	1.9973	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0051	1.9649	0.0101	0.5501	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Pressure	1,751	psia	10.0000	0.0000	10.0000	0.4303	1.9699	0.8477	10.0359	0.00E+00	0.0000	0.0000	0.0000
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0041	1.9699	0.0081	2.5000	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	275	Deg F	2.0000	0.0000	2.0000	0.0065		0.0065	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,620	psia	1.3000		1.3000	0.3633	1.9649	0.7139	1.4831	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.0914	1.9649	0.1797	0.5786	0.00E+00	0.0000	0.0000	0.0000
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0005	1.9649	0.0010	0.0034	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0023	1.9699	0.0046	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.0246	1.9699	0.0485	2.0006	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	30.9632	31.0277	0.3643	2.3060	0.8401	31.0391	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0253	1.9649	0.0498	0.0819	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	77	psia	2.5000	0.0000	2.5000	0.0071	1.9699	0.0141	2.5000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0161	1.9699	0.0316	2.0003	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,417	psia	12.5000	0.0000	12.5000	0.2587	1.9699	0.5097	12.5104	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0137	1.9699	0.0269	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0043	1.9699	0.0085	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	386	psia	2.5000	0.0000	2.5000	0.0294	1.9699	0.0579	2.5007	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	372	psia	2.5000	0.0000	2.5000	0.0279	1.9699	0.0550	2.5006	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0046	1.9699	0.0090	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0270	1.9699	0.0532	2.0007	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	99	Deg F	2.0000	0.0000	2.0000	0.0891		0.0891	2.0020	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	107	Deg F	2.0000	0.0000	2.0000	0.0593		0.0593	2.0009	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	68	Deg F	2.0000	0.0000	2.0000	0.1085		0.1085	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0335		0.0335	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,599	kW	492.7739	0.0000	492.7739	28.4549	1.9699	56.0545	495.9518	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,697	kW	50.2975	0.0000	50.2975	6.9264	1.9699	13.6446	52.1154	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,916	kW	442.5386	0.0000	442.5386	27.6694	1.9699	54.5070	445.8828	9.96E-01	440.8035	54.2933	444.1346
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	492	kW	2.1157	0.0000	2.1157	6.0951	1.9649	11.9765	12.1619	1.00E+00	2.1157	11.9765	12.1619
Manual Auxiliary Loads	200	kW	9.1565	0.0000	9.1565	0.0000	0.0000	0.0000	9.1565	1.00E+00	9.1565	0.0000	9.1565
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	879,152	lbm/hr	8791.5248		8791.5248			0.0000	8791.5248	0.00E+00	0.0000	0.0000	0.0000
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	449.332	56.361	
													0.00
										Pre-Test Total Corrected Output			452.85
										Uncertainty			0.45%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Heat Rate			11,860
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 2	1												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0003	0.0033	-1.60E+00	-0.0052	-0.0005	0.0052
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.50E+01	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	7.72E+02	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	1.6984	1.7182	0.0758	1.9649	0.1489	1.7247	7.53E-01	1.2936	0.1121	1.2985
Ambient Wet Bulb Temperature	71		0.2600	0.7781	0.8204	0.0697	1.9649	0.1369	0.8317	6.26E-01	0.5136	0.0857	0.5207
Cooling Tower Wet Bulb Temperature	70		0.2600	1.0368	1.0689	0.0552	1.9649	0.1085	1.0744	1.51E-06	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	-2.41E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0397	0.2039	0.0036	1.9649	0.0071	0.2040	6.65E+01	13.5625	0.4752	13.5708
Economizer Flue Gas Exit Temperature	493	Deg F	2.2410	6.8532	7.2103	0.0376	1.9649	0.0740	7.2107	9.95E-04	0.0072	0.0001	0.0072
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	68	Deg F	2.0000	0.0000	2.0000	0.1085	1.9699	0.2137	2.0114	2.46E-07	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	99	Deg F	2.0000	0.0000	2.0000	0.0891	1.9699	0.1755	2.0077	6.99E-09	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	493	Deg F	0.0000		0.0000			0.0000	0.0000	-4.63E-03	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	432		8.6346		8.6346			0.0000	8.6346	3.26E+00	28.1302	0.0000	28.1302
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	408		2.0000	0.0000	2.0000	0.1221	1.9699	0.2404	2.0144	-3.44E+00	-6.8876	-0.8280	6.9372
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	309	Deg F	2.0000	0.3544	2.0312	0.0134	1.9649	0.0263	2.0313	4.72E+00	9.5839	0.1241	9.5848
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	107	Deg F	2.0000	0.0000	2.0000	0.0593	1.9699	0.1168	2.0034	1.19E+00	2.3782	0.1389	2.3823
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	-3.36E-07	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	1.24E-07	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	443	Deg F	2.1240	0.0000	2.1240	0.0149	1.9699	0.0293	2.1242	1.97E-03	0.0042	0.0001	0.0042
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0335	1.9699	0.0659	2.0011	-1.87E+00	-3.7486	-0.1235	3.7506
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	-1.19E-06	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	4.43E-07	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	426	Deg F	2.0115	0.0000	2.0115	0.0468	1.9699	0.0922	2.0136	-7.66E-08	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0136	1.9699	0.0267	2.0002	-6.78E-01	-1.3554	-0.0181	1.3556
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	7.29E+01	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2476	0.5580	0.0039	1.9649	0.0077	0.5580	-8.01E-05	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0045	0.3000	0.0084	1.9649	0.0166	0.3005	-4.03E+01	-12.0927	-0.6687	12.1112
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0187	0.5004	0.0052	1.9649	0.0102	0.5005	2.66E-05	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	27	ppm	5.0000	0.0306	5.0001	0.1677	1.9649	0.3296	5.0109	-5.71E-07	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	1.77E-08	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	2.24E-08	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-1.63E+00	-3.2575	0.0000	3.2575
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	8.51E-07	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	7.21E-08	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	1.12E-03	0.0336	0.0000	0.0336
Fly Ash Temperature	420	Deg F			0.0000			0.0000	0.0000	1.69E-02	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	493	Deg F			0.0000			0.0000	0.0000	9.96E-04	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	309	Deg F			0.0000			0.0000	0.0000	3.14E-04	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	37	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.57E+01	10.6961	0.0000	10.6961
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	2.46E+01	26.4775	0.0000	26.4775
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	3.72E+02	262.6070	0.0000	262.6070
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	6.75E+00	0.5293	0.0000	0.5293
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	1.34E+01	0.0785	0.0000	0.0785
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	3.16E+01	6.6929	0.0000	6.6929
Oxygen	25	wt %			0.0000			0.0000	0.0000	-7.69E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	2.45E-06	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-3.10E+02	-92.9631	0.0000	92.9631
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.73E-06	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	8.94E-01	1.5731	0.0000	1.5731
Total Carbon	7	wt %			0.0000			0.0000	0.0000	2.55E-05	0.0000	0.0000	0.0000
Organic Carbon Level	7	wt %			0.0000			0.0000	0.0000	-5.44E-06	0.0000	0.0000	0.0000
Unburned Carbon	7	wt %	0.6865	0.0000	0.6865	2.1650	12.7062	27.5089	27.5175	1.07E+01	7.3440	294.2846	294.3762
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	1.81E-03	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	1.37E-01	0.0137	0.0000	0.0137
Total Carbon	1	wt %			0.0000			0.0000	0.0000	2.37E-04	0.0000	0.0000	0.0000
Organic Carbon Level	1	wt %			0.0000			0.0000	0.0000	1.26E-04	0.0000	0.0000	0.0000
Unburned Carbon	1	wt %	0.0520	0.0000	0.0520	0.0700	12.7062	0.8894	0.8910	4.28E-01	0.0223	0.3807	0.3813
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	3.20E-01	0.0320	0.0000	0.0320
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-6.45E-02	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	7.91E-04	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0090	0.0000	0.0090	0.0700	12.7062	0.8894	0.8895	3.05E-01	0.0027	0.2712	0.2713
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-2.71E-01	-0.0005	0.0000	0.0005
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	1.02E-01	0.0041	0.0000	0.0041
Unburned Carbon	1	%			0.0000			0.0000	0.0000	2.42E-01	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,501	kW			0.0000			0.0000	0.0000	-1.20E-07	0.0000	0.0000	0.0000
PA Fans	1,021	kW	10.2100	0.0000	10.2100	0.0000	0.0000	0.0000	10.2100	1.07E-08	0.0000	0.0000	0.0000
SA Fans	260	kW	2.5960	0.0000	2.5960	0.0000	0.0000	0.0000	2.5960	-1.16E-08	0.0000	0.0000	0.0000
ID Fan	2,746	kW	27.4630	0.0000	27.4630	0.0000	0.0000	0.0000	27.4630	3.93E-10	0.0000	0.0000	0.0000
Recirc Fan	783	kW	7.8250	0.0000	7.8250	0.0000	0.0000	0.0000	7.8250	-3.41E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	1.07E-09	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.0886	0.0000	8.0886	0.0589	1.9699	0.1161	8.0894	-1.30E-04	-0.0011	0.0000	0.0011
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	1.24E-06	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	-4.30E-08	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9982	0.0000	24.9982	0.1901	1.9699	0.3744	25.0010	8.81E-04	0.0220	0.0003	0.0220
Flue Gas Recirc Flow Rate	185,309	lbm/hr	9265.4404	0.0000	9265.4404	82.1429	1.9699	161.8165	9266.8533	-3.35E-04	-3.1012	-0.0542	3.1016
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	2.70E-08	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	-3.08E-04	-0.0007	0.0000	0.0007

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Heat Rate			11,860
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,v}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	1.20E-08	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	1.42E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	-4.86E-06	0.0000	0.0000	0.0000
Primary Air Flow Rate	287,139	lbm/h	14,356.96	0.00	14,356.96	165.81	1.97	326.64	14,360.67	1.05E-04	1.5106	0.0344	1.5110
Secondary Air Flow Rate	558,141	lbm/h	27,907.05	0.00	27,907.05	601.57	1.96	1,180.04	27,931.99	-5.44E-05	-1.5181	-0.0642	1.5195
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9867	8.2972	10.8469	0.4194	2.1448	0.8995	10.8842	1.22E-01	1.3183	0.1093	1.3229
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,351	psia	1.9500	0.0000	1.9500	0.2198	1.9649	0.4319	1.9973	2.94E-02	0.0572	0.0127	0.0586
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0051	1.9649	0.0101	0.5501	-1.60E+01	-8.8269	-0.1618	8.8284
Boiler Drum Pressure	1,751	psia	10.0000	0.0000	10.0000	0.4303	1.9699	0.8477	10.0359	-1.15E-04	-0.0012	-0.0001	0.0012
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0041	1.9699	0.0081	2.5000	7.97E-06	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	275	Deg F	2.0000	0.0000	2.0000	0.0065		0.0065	2.0000	1.24E-09	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,620	psia	1.3000		1.3000	0.3633	1.9649	0.7139	1.4831	-3.38E-01	-0.4394	-0.2413	0.5013
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.0914	1.9649	0.1797	0.5786	6.54E+00	3.5979	1.1753	3.7850
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0005	1.9649	0.0010	0.0034	5.17E-04	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0023	1.9699	0.0046	2.5000	-1.18E-03	-0.0029	0.0000	0.0029
Bottom Ash Cooling Water Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.0246	1.9699	0.0485	2.0006	-8.78E-01	-1.7561	-0.0426	1.7566
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	2.16E-03	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	30.9632	31.0277	0.3643	2.3060	0.8401	31.0391	8.78E-01	27.2416	0.7376	27.2516
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	-6.60E-04	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	6.17E-09	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-3.81E+02	-3.8093	0.0000	3.8093
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	4.27E+03	42.6778	0.0000	42.6778
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0253	1.9649	0.0498	0.0819	8.86E+01	5.7585	4.4114	7.2540
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	77	psia	2.5000	0.0000	2.5000	0.0071	1.9699	0.0141	2.5000	2.69E-09	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0161	1.9699	0.0316	2.0003	5.52E-11	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,417	psia	12.5000	0.0000	12.5000	0.2587	1.9699	0.5097	12.5104	4.14E-13	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0137	1.9699	0.0269	2.0002	3.27E-13	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0043	1.9699	0.0085	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	386	psia	2.5000	0.0000	2.5000	0.0294	1.9699	0.0579	2.5007	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	372	psia	2.5000	0.0000	2.5000	0.0279	1.9699	0.0550	2.5006	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0046	1.9699	0.0090	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0270	1.9699	0.0532	2.0007	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.58E+00	-0.1583	0.0000	0.1583
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-2.57E-02	-0.0026	0.0000	0.0026
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	2.86E-06	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-5.54E-07	0.0000	0.0000	0.0000
DI Start Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.11E-07	0.0000	0.0000	0.0000
DI End Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-8.51E-09	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	99	Deg F	2.0000	0.0000	2.0000	0.0891		0.0891	2.0020	-1.58E-10	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	107	Deg F	2.0000	0.0000	2.0000	0.0593		0.0593	2.0009	-1.10E-11	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	68	Deg F	2.0000	0.0000	2.0000	0.1085		0.1085	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0335		0.0335	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,599	kW	492.7739	0.0000	492.7739	28.4549	1.9699	56.0545	495.9518	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,697	kW	50.2975	0.0000	50.2975	6.9264	1.9699	13.6446	52.1154	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,916	kW	442.5386	0.0000	442.5386	27.6694	1.9699	54.5070	445.8828	-1.10E-01	-48.7325	-6.0023	49.1008
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	492	kW	2.1157	0.0000	2.1157	6.0951	1.9649	11.9765	12.1619	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	200	kW	9.1565	0.0000	9.1565	0.0000	0.0000	0.0000	9.1565	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	879,152	lbm/hr	8791.5248		8791.5248			0.0000	8791.5248	1.29E-02	113.7485	0.0000	113.7485
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	312.812	294.385	
													0.00
										Pre-Test Total Corrected Output			429.55
										Uncertainty			3.62%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Boiler Flow			870,397
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,v}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 2	1												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0003	0.0033	-6.32E-03	0.0000	0.0000	0.0000
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	1.6984	1.7182	0.0758	1.9649	0.1489	1.7247	0.00E+00	0.0000	0.0000	0.0000
Ambient Wet Bulb Temperature	71		0.2600	0.7781	0.8204	0.0697	1.9649	0.1369	0.8317	0.00E+00	0.0000	0.0000	0.0000
Cooling Tower Wet Bulb Temperature	70		0.2600	1.0368	1.0689	0.0552	1.9649	0.1085	1.0744	0.00E+00	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0397	0.2039	0.0036	1.9649	0.0071	0.2040	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	493	Deg F	2.2410	6.8532	7.2103	0.0376	1.9649	0.0740	7.2107	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	68	Deg F	2.0000	0.0000	2.0000	0.1085	1.9699	0.2137	2.0114	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	99	Deg F	2.0000	0.0000	2.0000	0.0891	1.9699	0.1755	2.0077	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	493	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	432		8.6346		8.6346			0.0000	8.6346	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	408		2.0000	0.0000	2.0000	0.1221	1.9699	0.2404	2.0144	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	309	Deg F	2.0000	0.3544	2.0312	0.0134	1.9649	0.0263	2.0313	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	107	Deg F	2.0000	0.0000	2.0000	0.0593	1.9699	0.1168	2.0034	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	443	Deg F	2.1240	0.0000	2.1240	0.0149	1.9699	0.0293	2.1242	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0335	1.9699	0.0659	2.0011	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	426	Deg F	2.0115	0.0000	2.0115	0.0468	1.9699	0.0922	2.0136	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0136	1.9699	0.0267	2.0002	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2476	0.5580	0.0039	1.9649	0.0077	0.5580	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0045	0.3000	0.0084	1.9649	0.0166	0.3005	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0187	0.5004	0.0052	1.9649	0.0102	0.5005	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	27	ppm	5.0000	0.0306	5.0001	0.1677	1.9649	0.3296	5.0109	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	420	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	493	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	309	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	37	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	7	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	7	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	7	wt %	0.6865	0.0000	0.6865	2.1650	12.7062	27.5089	27.5175	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	1	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	1	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	1	wt %	0.0520	0.0000	0.0520	0.0700	12.7062	0.8894	0.8910	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0090	0.0000	0.0090	0.0700	12.7062	0.8894	0.8895	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	1	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,501	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PA Fans	1,021	kW	10.2100	0.0000	10.2100	0.0000	0.0000	0.0000	10.2100	0.00E+00	0.0000	0.0000	0.0000
SA Fans	260	kW	2.5960	0.0000	2.5960	0.0000	0.0000	0.0000	2.5960	0.00E+00	0.0000	0.0000	0.0000
ID Fan	2,746	kW	27.4630	0.0000	27.4630	0.0000	0.0000	0.0000	27.4630	0.00E+00	0.0000	0.0000	0.0000
Recirc Fan	783	kW	7.8250	0.0000	7.8250	0.0000	0.0000	0.0000	7.8250	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.0886	0.0000	8.0886	0.0589	1.9699	0.1161	8.0894	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9982	0.0000	24.9982	0.1901	1.9699	0.3744	25.0010	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	185,309	lbm/hr	9265.4404	0.0000	9265.4404	82.1429	1.9699	161.8165	9266.8533	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Boiler Flow			870,397
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	287,139	lbm/h	14,356.96	0.00	14,356.96	165.81	1.97	326.64	14,360.67	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	558,141	lbm/h	27,907.05	0.00	27,907.05	601.57	1.96	1,180.04	27,931.99	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9867	8.2972	10.8469	0.4194	2.1448	0.8995	10.8842	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,351	psia	1.9500	0.0000	1.9500	0.2198	1.9649	0.4319	1.9973	2.97E+00	5.7909	1.2826	5.9312
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0051	1.9649	0.0101	0.5501	-3.41E+02	-187.7792	-3.4427	187.8107
Boiler Drum Pressure	1,751	psia	10.0000	0.0000	10.0000	0.4303	1.9699	0.8477	10.0359	-6.32E-03	-0.0632	-0.0054	0.0634
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0041	1.9699	0.0081	2.5000	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	275	Deg F	2.0000	0.0000	2.0000	0.0065		0.0065	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,620	psia	1.3000		1.3000	0.3633	1.9649	0.7139	1.4831	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.0914	1.9649	0.1797	0.5786	0.00E+00	0.0000	0.0000	0.0000
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0005	1.9649	0.0010	0.0034	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0023	1.9699	0.0046	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.0246	1.9699	0.0485	2.0006	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	30.9632	31.0277	0.3643	2.3060	0.8401	31.0391	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-2.91E+04	-291.3988	0.0000	291.3988
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	3.26E+05	3264.1666	0.0000	3264.1666
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0253	1.9649	0.0498	0.0819	6.78E+03	440.6058	337.5331	555.0333
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	77	psia	2.5000	0.0000	2.5000	0.0071	1.9699	0.0141	2.5000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0161	1.9699	0.0316	2.0003	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,417	psia	12.5000	0.0000	12.5000	0.2587	1.9699	0.5097	12.5104	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0137	1.9699	0.0269	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0043	1.9699	0.0085	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	386	psia	2.5000	0.0000	2.5000	0.0294	1.9699	0.0579	2.5007	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	372	psia	2.5000	0.0000	2.5000	0.0279	1.9699	0.0550	2.5006	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0046	1.9699	0.0090	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0270	1.9699	0.0532	2.0007	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.75E+02	-17.5153	0.0000	17.5153
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	1.75E+02	17.5154	0.0000	17.5154
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	99	Deg F	2.0000	0.0000	2.0000	0.0891		0.0891	2.0020	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	107	Deg F	2.0000	0.0000	2.0000	0.0593		0.0593	2.0009	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	68	Deg F	2.0000	0.0000	2.0000	0.1085		0.1085	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0335		0.0335	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,599	kW	492.7739	0.0000	492.7739	28.4549	1.9699	56.0545	495.9518	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,697	kW	50.2975	0.0000	50.2975	6.9264	1.9699	13.6446	52.1154	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,916	kW	442.5386	0.0000	442.5386	27.6694	1.9699	54.5070	445.8828	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	492	kW	2.1157	0.0000	2.1157	6.0951	1.9649	11.9765	12.1619	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	200	kW	9.1565	0.0000	9.1565	0.0000	0.0000	0.0000	9.1565	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	879,152	lbm/hr	8791.5248		8791.5248			0.0000	8791.5248	9.90E-01	8703.6095	0.0000	8703.6095
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	9,312.49	337.553	
													-613.58
										Pre-Test Total Corrected Output			9,318.58
										Uncertainty			1.07%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Fuel Heat Input			1,207
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 2	1												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0003	0.0033	-1.63E-01	-0.0005	-0.0001	0.0005
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.54E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	7.94E+01	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	1.6984	1.7182	0.0758	1.9649	0.1489	1.7247	7.66E-02	0.1317	0.0114	0.1322
Ambient Wet Bulb Temperature	71		0.2600	0.7781	0.8204	0.0697	1.9649	0.1369	0.8317	6.44E-02	0.0529	0.0088	0.0536
Cooling Tower Wet Bulb Temperature	70		0.2600	1.0368	1.0689	0.0552	1.9649	0.1085	1.0744	1.55E-07	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	-2.45E-01	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0397	0.2039	0.0036	1.9649	0.0071	0.2040	6.85E+00	1.3958	0.0489	1.3967
Economizer Flue Gas Exit Temperature	493	Deg F	2.2410	6.8532	7.2103	0.0376	1.9649	0.0740	7.2107	1.02E-04	0.0007	0.0000	0.0007
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	68	Deg F	2.0000	0.0000	2.0000	0.1085	1.9699	0.2137	2.0114	2.53E-08	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	99	Deg F	2.0000	0.0000	2.0000	0.0891	1.9699	0.1755	2.0077	7.19E-10	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	493	Deg F	0.0000		0.0000			0.0000	0.0000	-4.71E-04	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	432		8.6346		8.6346			0.0000	8.6346	3.32E-01	2.8634	0.0000	2.8634
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	408		2.0000	0.0000	2.0000	0.1221	1.9699	0.2404	2.0144	-3.51E-01	-0.7011	-0.0843	0.7061
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	309	Deg F	2.0000	0.3544	2.0312	0.0134	1.9649	0.0263	2.0313	4.86E-01	0.9863	0.0128	0.9864
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	107	Deg F	2.0000	0.0000	2.0000	0.0593	1.9699	0.1168	2.0034	1.21E-01	0.2421	0.0141	0.2425
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	-3.46E-08	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	1.26E-08	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	443	Deg F	2.1240	0.0000	2.1240	0.0149	1.9699	0.0293	2.1242	2.00E-04	0.0004	0.0000	0.0004
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0335	1.9699	0.0659	2.0011	-1.93E-01	-0.3858	-0.0127	0.3860
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	-1.22E-07	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	4.51E-08	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	426	Deg F	2.0115	0.0000	2.0115	0.0468	1.9699	0.0922	2.0136	-7.80E-09	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0136	1.9699	0.0267	2.0002	-6.90E-02	-0.1380	-0.0018	0.1380
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	7.42E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2476	0.5580	0.0039	1.9649	0.0077	0.5580	-8.15E-06	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0045	0.3000	0.0084	1.9649	0.0166	0.3005	-4.10E+00	-1.2309	-0.0681	1.2328
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0187	0.5004	0.0052	1.9649	0.0102	0.5005	2.71E-06	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	27	ppm	5.0000	0.0306	5.0001	0.1677	1.9649	0.3296	5.0109	-5.81E-08	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	1.80E-09	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	2.28E-09	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-1.68E-01	-0.3352	0.0000	0.3352
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	8.76E-08	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	7.43E-09	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	1.15E-04	0.0035	0.0000	0.0035
Fly Ash Temperature	420	Deg F			0.0000			0.0000	0.0000	1.74E-03	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	493	Deg F			0.0000			0.0000	0.0000	1.02E-04	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	309	Deg F			0.0000			0.0000	0.0000	3.23E-05	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	37	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.67E+00	1.1008	0.0000	1.1008
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	2.53E+00	2.7250	0.0000	2.7250
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	3.79E+01	26.7309	0.0000	26.7309
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	6.95E-01	0.0545	0.0000	0.0545
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	1.37E+00	0.0081	0.0000	0.0081
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	3.25E+00	0.6888	0.0000	0.6888
Oxygen	25	wt %			0.0000			0.0000	0.0000	-7.83E-01	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	2.52E-07	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-3.15E+01	-9.4628	0.0000	9.4628
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.84E-07	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	9.20E-02	0.1619	0.0000	0.1619
Total Carbon	7	wt %			0.0000			0.0000	0.0000	2.63E-06	0.0000	0.0000	0.0000
Organic Carbon Level	7	wt %			0.0000			0.0000	0.0000	-5.60E-07	0.0000	0.0000	0.0000
Unburned Carbon	7	wt %	0.6865	0.0000	0.6865	2.1650	12.7062	27.5089	27.5175	1.10E+00	0.7558	30.2866	30.2960
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	1.87E-04	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	1.41E-02	0.0014	0.0000	0.0014
Total Carbon	1	wt %			0.0000			0.0000	0.0000	2.44E-05	0.0000	0.0000	0.0000
Organic Carbon Level	1	wt %			0.0000			0.0000	0.0000	1.30E-05	0.0000	0.0000	0.0000
Unburned Carbon	1	wt %	0.0520	0.0000	0.0520	0.0700	12.7062	0.8894	0.8910	4.40E-02	0.0023	0.0392	0.0392
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	3.29E-02	0.0033	0.0000	0.0033
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-6.57E-03	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	8.05E-05	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0090	0.0000	0.0090	0.0700	12.7062	0.8894	0.8895	3.14E-02	0.0003	0.0279	0.0279
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-2.79E-02	-0.0001	0.0000	0.0001
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	1.05E-02	0.0004	0.0000	0.0004
Unburned Carbon	1	%			0.0000			0.0000	0.0000	2.49E-02	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,501	kW			0.0000			0.0000	0.0000	-1.22E-08	0.0000	0.0000	0.0000
PA Fans	1,021	kW	10.2100	0.0000	10.2100	0.0000	0.0000	0.0000	10.2100	1.08E-09	0.0000	0.0000	0.0000
SA Fans	260	kW	2.5960	0.0000	2.5960	0.0000	0.0000	0.0000	2.5960	-1.18E-09	0.0000	0.0000	0.0000
ID Fan	2,746	kW	27.4630	0.0000	27.4630	0.0000	0.0000	0.0000	27.4630	4.00E-11	0.0000	0.0000	0.0000
Recirc Fan	783	kW	7.8250	0.0000	7.8250	0.0000	0.0000	0.0000	7.8250	-3.48E-11	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	1.09E-10	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.0886	0.0000	8.0886	0.0589	1.9699	0.1161	8.0894	-1.34E-05	-0.0001	0.0000	0.0001
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	1.27E-07	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	-4.42E-09	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9982	0.0000	24.9982	0.1901	1.9699	0.3744	25.0010	9.07E-05	0.0023	0.0000	0.0023
Flue Gas Recirc Flow Rate	185,309	lbm/hr	9265.4404	0.0000	9265.4404	82.1429	1.9699	161.8165	9266.8533	-3.41E-05	-0.3157	-0.0055	0.3157
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	2.75E-09	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	-3.17E-05	-0.0001	0.0000	0.0001

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Fuel Heat Input			1,207
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,v}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	1.24E-09	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	1.45E-01	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	-4.94E-07	0.0000	0.0000	0.0000
Primary Air Flow Rate	287,139	lbm/h	14,356.96	0.00	14,356.96	165.81	1.97	326.64	14,360.67	1.08E-05	0.1555	0.0035	0.1555
Secondary Air Flow Rate	558,141	lbm/h	27,907.05	0.00	27,907.05	601.57	1.96	1,180.04	27,931.99	-5.60E-06	-0.1562	-0.0066	0.1564
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9867	8.2972	10.8469	0.4194	2.1448	0.8995	10.8842	1.25E-02	0.1357	0.0113	0.1361
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,351	psia	1.9500	0.0000	1.9500	0.2198	1.9649	0.4319	1.9973	3.02E-03	0.0059	0.0013	0.0060
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0051	1.9649	0.0101	0.5501	-1.65E+00	-0.9084	-0.0167	0.9086
Boiler Drum Pressure	1,751	psia	10.0000	0.0000	10.0000	0.4303	1.9699	0.8477	10.0359	-1.19E-05	-0.0001	0.0000	0.0001
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0041	1.9699	0.0081	2.5000	8.21E-07	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	275	Deg F	2.0000	0.0000	2.0000	0.0065		0.0065	2.0000	1.28E-10	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,620	psia	1.3000		1.3000	0.3633	1.9649	0.7139	1.4831	-3.48E-02	-0.0452	-0.0248	0.0516
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.0914	1.9649	0.1797	0.5786	6.73E-01	0.3703	0.1210	0.3895
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0005	1.9649	0.0010	0.0034	5.32E-05	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0023	1.9699	0.0046	2.5000	-1.20E-04	-0.0003	0.0000	0.0003
Bottom Ash Cooling Water Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.0246	1.9699	0.0485	2.0006	-8.94E-02	-0.1788	-0.0043	0.1788
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	2.20E-04	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	30.9632	31.0277	0.3643	2.3060	0.8401	31.0391	8.94E-02	2.7729	0.0751	2.7740
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	-6.71E-05	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	6.28E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-3.92E+01	-0.3920	0.0000	0.3920
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	4.39E+02	4.3922	0.0000	4.3922
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0253	1.9649	0.0498	0.0819	9.12E+00	0.5926	0.4540	0.7466
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	77	psia	2.5000	0.0000	2.5000	0.0071	1.9699	0.0141	2.5000	2.76E-10	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0161	1.9699	0.0316	2.0003	5.70E-12	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,417	psia	12.5000	0.0000	12.5000	0.2587	1.9699	0.5097	12.5104	4.70E-14	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0137	1.9699	0.0269	2.0002	4.09E-14	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0043	1.9699	0.0085	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	386	psia	2.5000	0.0000	2.5000	0.0294	1.9699	0.0579	2.5007	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	372	psia	2.5000	0.0000	2.5000	0.0279	1.9699	0.0550	2.5006	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0046	1.9699	0.0090	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0270	1.9699	0.0532	2.0007	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.63E-01	-0.0163	0.0000	0.0163
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-2.65E-03	-0.0003	0.0000	0.0003
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	2.94E-07	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-5.70E-08	0.0000	0.0000	0.0000
DI Start Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.14E-08	0.0000	0.0000	0.0000
DI End Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-8.76E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	99	Deg F	2.0000	0.0000	2.0000	0.0891		0.0891	2.0020	-1.63E-11	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	107	Deg F	2.0000	0.0000	2.0000	0.0593		0.0593	2.0009	-1.16E-12	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	68	Deg F	2.0000	0.0000	2.0000	0.1085		0.1085	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0335		0.0335	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,599	kW	492.7739	0.0000	492.7739	28.4549	1.9699	56.0545	495.9518	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,697	kW	50.2975	0.0000	50.2975	6.9264	1.9699	13.6446	52.1154	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,916	kW	442.5386	0.0000	442.5386	27.6694	1.9699	54.5070	445.8828	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	492	kW	2.1157	0.0000	2.1157	6.0951	1.9649	11.9765	12.1619	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	200	kW	9.1565	0.0000	9.1565	0.0000	0.0000	0.0000	9.1565	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	879,152	lbm/hr	8791.5248		8791.5248			0.0000	8791.5248	1.33E-03	11.7065	0.0000	11.7065
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	31.512	30.291	
													0.00
										Pre-Test Total Corrected Output			43.71
										Uncertainty			3.62%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Auxiliary Load			5,071
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 2	1												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0003	0.0033	2.07E-05	0.0000	0.0000	0.0000
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	75	Deg F	0.2600	1.6984	1.7182	0.0758	1.9649	0.1489	1.7247	0.00E+00	0.0000	0.0000	0.0000
Ambient Wet Bulb Temperature	71		0.2600	0.7781	0.8204	0.0697	1.9649	0.1369	0.8317	0.00E+00	0.0000	0.0000	0.0000
Cooling Tower Wet Bulb Temperature	70		0.2600	1.0368	1.0689	0.0552	1.9649	0.1085	1.0744	0.00E+00	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0397	0.2039	0.0036	1.9649	0.0071	0.2040	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	493	Deg F	2.2410	6.8532	7.2103	0.0376	1.9649	0.0740	7.2107	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	68	Deg F	2.0000	0.0000	2.0000	0.1085	1.9699	0.2137	2.0114	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	99	Deg F	2.0000	0.0000	2.0000	0.0891	1.9699	0.1755	2.0077	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	493	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	432		8.6346		8.6346			0.0000	8.6346	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	408		2.0000	0.0000	2.0000	0.1221	1.9699	0.2404	2.0144	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	309	Deg F	2.0000	0.3544	2.0312	0.0134	1.9649	0.0263	2.0313	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	107	Deg F	2.0000	0.0000	2.0000	0.0593	1.9699	0.1168	2.0034	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	443	Deg F	2.1240	0.0000	2.1240	0.0149	1.9699	0.0293	2.1242	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0335	1.9699	0.0659	2.0011	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	426	Deg F	2.0115	0.0000	2.0115	0.0468	1.9699	0.0922	2.0136	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0136	1.9699	0.0267	2.0002	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2476	0.5580	0.0039	1.9649	0.0077	0.5580	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0045	0.3000	0.0084	1.9649	0.0166	0.3005	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0187	0.5004	0.0052	1.9649	0.0102	0.5005	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	27	ppm	5.0000	0.0306	5.0001	0.1677	1.9649	0.3296	5.0109	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Sorbent Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	420	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	493	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	309	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	37	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	6.92E+01	20.7619	0.0000	20.7619
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	7	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	7	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	7	wt %	0.6865	0.0000	0.6865	2.1650	12.7062	27.5089	27.5175	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	1	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	1	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	1	wt %	0.0520	0.0000	0.0520	0.0700	12.7062	0.8894	0.8910	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0090	0.0000	0.0090	0.0700	12.7062	0.8894	0.8895	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	1	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,501	kW			0.0000			0.0000	0.0000	9.22E-01	0.0000	0.0000	0.0000
PA Fans	1,021	kW	10.2100	0.0000	10.2100	0.0000	0.0000	0.0000	10.2100	9.22E-01	9.4114	0.0000	9.4114
SA Fans	260	kW	2.5960	0.0000	2.5960	0.0000	0.0000	0.0000	2.5960	9.22E-01	2.3929	0.0000	2.3929
ID Fan	2,746	kW	27.4630	0.0000	27.4630	0.0000	0.0000	0.0000	27.4630	9.22E-01	25.3149	0.0000	25.3149
Recirc Fan	783	kW	7.8250	0.0000	7.8250	0.0000	0.0000	0.0000	7.8250	9.22E-01	7.2129	0.0000	7.2129
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.0886	0.0000	8.0886	0.0589	1.9699	0.1161	8.0894	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	75	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9982	0.0000	24.9982	0.1901	1.9699	0.3744	25.0010	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	185,309	lbm/hr	9265.4404	0.0000	9265.4404	82.1429	1.9699	161.8165	9266.8533	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Auxiliary Load			5,071
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	287,139	lbm/h	14,356.96	0.00	14,356.96	165.81	1.97	326.64	14,360.67	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	558,141	lbm/h	27,907.05	0.00	27,907.05	601.57	1.96	1,180.04	27,931.99	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9867	8.2972	10.8469	0.4194	2.1448	0.8995	10.8842	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,351	psia	1.9500	0.0000	1.9500	0.2198	1.9649	0.4319	1.9973	-5.29E-03	-0.0103	-0.0023	0.0106
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0051	1.9649	0.0101	0.5501	2.89E+00	1.5902	0.0292	1.5905
Boiler Drum Pressure	1,751	psia	10.0000	0.0000	10.0000	0.4303	1.9699	0.8477	10.0359	2.07E-05	0.0002	0.0000	0.0002
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0041	1.9699	0.0081	2.5000	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	275	Deg F	2.0000	0.0000	2.0000	0.0065		0.0065	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,620	psia	1.3000		1.3000	0.3633	1.9649	0.7139	1.4831	6.09E-02	0.0792	0.0435	0.0903
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.0914	1.9649	0.1797	0.5786	-1.18E+00	-0.6482	-0.2117	0.6819
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0005	1.9649	0.0010	0.0034	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0023	1.9699	0.0046	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.0246	1.9699	0.0485	2.0006	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	112	Deg F	2.0000	30.9632	31.0277	0.3643	2.3060	0.8401	31.0391	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	6.86E+01	0.6861	0.0000	0.6861
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	-7.69E+02	-7.6857	0.0000	7.6857
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0253	1.9649	0.0498	0.0819	-1.60E+01	-1.0374	-0.7947	1.3069
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	77	psia	2.5000	0.0000	2.5000	0.0071	1.9699	0.0141	2.5000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0161	1.9699	0.0316	2.0003	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,417	psia	12.5000	0.0000	12.5000	0.2587	1.9699	0.5097	12.5104	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	278	Deg F	2.0000	0.0000	2.0000	0.0137	1.9699	0.0269	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	76	Deg F	2.0000	0.0000	2.0000	0.0043	1.9699	0.0085	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	386	psia	2.5000	0.0000	2.5000	0.0294	1.9699	0.0579	2.5007	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	372	psia	2.5000	0.0000	2.5000	0.0279	1.9699	0.0550	2.5006	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0046	1.9699	0.0090	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0270	1.9699	0.0532	2.0007	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	5.75E-01	0.0575	0.0000	0.0575
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-5.75E-01	-0.0575	0.0000	0.0575
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	26	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	99	Deg F	2.0000	0.0000	2.0000	0.0891		0.0891	2.0020	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	107	Deg F	2.0000	0.0000	2.0000	0.0593		0.0593	2.0009	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	68	Deg F	2.0000	0.0000	2.0000	0.1085		0.1085	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0335		0.0335	2.0003	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,599	kW	492.7739	0.0000	492.7739	28.4549	1.9699	56.0545	495.9518	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,697	kW	50.2975	0.0000	50.2975	6.9264	1.9699	13.6446	52.1154	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,916	kW	442.5386	0.0000	442.5386	27.6694	1.9699	54.5070	445.8828	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	492	kW	2.1157	0.0000	2.1157	6.0951	1.9649	11.9765	12.1619	9.22E-01	1.9502	11.0397	11.2106
Manual Auxiliary Loads	200	kW	9.1565	0.0000	9.1565	0.0000	0.0000	0.0000	9.1565	9.22E-01	8.4403	0.0000	8.4403
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	879,152	lbm/hr	8791.5248		8791.5248			0.0000	8791.5248	-2.33E-03	-20.4933	0.0000	20.4933
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	42.152	11.070	
													1178.16
										Pre-Test Total Corrected Output			55.48
										Uncertainty			1.09%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Net Power Output 101,037			
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 3	2												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0004	0.0033	-3.00E+00	-0.0098	-0.0012	0.0098
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	6.79E+02	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	70	Deg F	0.2600	4.9556	4.9625	0.0686	1.9649	0.1347	4.9643	-4.46E-01	-2.2135	-0.0601	2.2143
Ambient Wet Bulb Temperature	67		0.2600	2.2924	2.3071	0.0540	1.9649	0.1061	2.3095	-4.71E+01	-108.6274	-4.9951	108.7422
Cooling Tower Wet Bulb Temperature	65		0.2600	0.2904	0.3898	0.0506	1.9649	0.0994	0.4023	7.79E+01	30.3617	7.7464	31.3344
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0422	0.2044	0.0037	1.9649	0.0073	0.2045	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	494	Deg F	2.2410	7.2813	7.6183	0.0345	1.9649	0.0678	7.6186	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	61	Deg F	2.0000	0.0000	2.0000	0.1083	1.9699	0.2134	2.0114	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	92	Deg F	2.0000	0.0000	2.0000	0.1028	1.9699	0.2025	2.0102	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	494	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	429		8.5731		8.5731			0.0000	8.5731	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	405		2.0000	0.0000	2.0000	0.1155	1.9699	0.2274	2.0129	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	310	Deg F	2.0000	0.3075	2.0235	0.0092	1.9649	0.0181	2.0236	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	106	Deg F	2.0000	0.0000	2.0000	0.0429	1.9699	0.0845	2.0018	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0067	1.9699	0.0132	2.1240	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0301	1.9699	0.0592	2.0009	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	427	Deg F	2.0115	0.0000	2.0115	0.0245	1.9699	0.0483	2.0121	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0095	1.9699	0.0187	2.0001	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2643	0.5656	0.0040	1.9649	0.0078	0.5656	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0039	0.3000	0.0036	1.9649	0.0071	0.3001	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0159	0.5003	0.0053	1.9649	0.0105	0.5004	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	25	ppm	5.0000	0.0249	5.0001	0.1854	1.9649	0.3642	5.0133	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-3.69E-05	-0.0001	0.0000	0.0001
Sorbent Temperature	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	417	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	494	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	310	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-8.67E-01	-0.2602	0.0000	0.2602
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.19E+00	0.9582	0.0000	0.9582
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	6	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	6	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	6	wt %	0.5605	0.0000	0.5605	1.5950	12.7062	20.2664	20.2741	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0350	0.0000	0.0350	0.0000	0.0000	0.0000	0.0350	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0040	0.0000	0.0040	0.0000	0.0000	0.0000	0.0040	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,303	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PA Fans	1,038	kW	10.3770	0.0000	10.3770	0.0000	0.0000	0.0000	10.3770	0.00E+00	0.0000	0.0000	0.0000
SA Fans	284	kW	2.8360	0.0000	2.8360	0.0000	0.0000	0.0000	2.8360	0.00E+00	0.0000	0.0000	0.0000
ID Fan	2,740	kW	27.4010	0.0000	27.4010	0.0000	0.0000	0.0000	27.4010	0.00E+00	0.0000	0.0000	0.0000
Recirc Fan	786	kW	7.8620	0.0000	7.8620	0.0000	0.0000	0.0000	7.8620	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.1197	0.0000	8.1197	0.0588	1.9699	0.1158	8.1205	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9964	0.0000	24.9964	0.1892	1.9699	0.3727	24.9992	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	186,277	lbm/hr	9313.8490	0.0000	9313.8490	75.8540	1.9699	149.4247	9315.0475	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Power Output			101,037
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	285,389	lbm/h	14,269.47	0.00	14,269.47	155.85	1.97	307.02	14,272.77	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	552,401	lbm/h	27,620.04	0.00	27,620.04	665.39	1.96	1,305.24	27,650.86	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9765	8.0644	10.6633	0.4123	2.1199	0.8740	10.6990	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,359	psia	1.9500	0.0000	1.9500	0.2937	1.9649	0.5771	2.0336	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0104	1.9649	0.0204	0.5504	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Pressure	1,749	psia	10.0000	0.0000	10.0000	0.4544	1.9699	0.8952	10.0400	0.00E+00	0.0000	0.0000	0.0000
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0102	1.9699	0.0201	2.5001	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0116		0.0116	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3801	1.9649	0.7468	1.4992	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.1013	1.9649	0.1990	0.5849	0.00E+00	0.0000	0.0000	0.0000
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0009	1.9649	0.0018	0.0037	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0034	1.9699	0.0067	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	90	Deg F	2.0000	0.0000	2.0000	0.0694	1.9699	0.1368	2.0047	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	111	Deg F	2.0000	23.4550	23.5401	0.5384	2.1199	1.1413	23.5678	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0311	1.9649	0.0611	0.0892	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0114	1.9699	0.0224	2.5001	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0153	1.9699	0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,424	psia	12.5000	0.0000	12.5000	0.3671	1.9699	0.7231	12.5209	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	277	Deg F	2.0000	0.0000	2.0000	0.0155	1.9699	0.0305	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	75	Deg F	2.0000	0.0000	2.0000	0.0042	1.9699	0.0084	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	384	psia	2.5000	0.0000	2.5000	0.0703	1.9699	0.1385	2.5038	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	370	psia	2.5000	0.0000	2.5000	0.0638	1.9699	0.1256	2.5032	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0111	1.9699	0.0218	2.0001	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	104	Deg F	2.0000	0.0000	2.0000	0.0473	1.9699	0.0931	2.0022	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-3	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	24	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.1028		0.1028	2.0026	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0429		0.0429	2.0005	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	61	Deg F	2.0000	0.0000	2.0000	0.1083		0.1083	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0301		0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,359	kW	491.7454	0.0000	491.7454	35.1170	1.9699	69.1768	496.5873	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,415	kW	49.0858	0.0000	49.0858	15.2497	1.9699	30.0404	57.5486	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,943	kW	442.6559	0.0000	442.6559	28.6814	1.9699	56.4994	446.2471	9.94E-01	440.1652	56.1815	443.7361
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	254	kW	1.0907	0.0000	1.0907	7.3152	1.9649	14.3737	14.4151	1.00E+00	1.0907	14.3737	14.4151
Manual Auxiliary Loads	202	kW	10.3460	0.0000	10.3460	0.0000	0.0000	0.0000	10.3460	1.00E+00	10.3460	0.0000	10.3460
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	874,752	lbm/hr	8747.5190		8747.5190			0.0000	8747.5190	0.00E+00	0.0000	0.0000	0.0000
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	454.512	58.719	
													0.00
										Pre-Test Total Corrected Output			458.29
										Uncertainty			0.45%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Net Heat Rate			11,834
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 3	2												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0004	0.0033	-1.61E+00	-0.0052	-0.0007	0.0053
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.31E+01	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	8.11E+02	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	70	Deg F	0.2600	4.9556	4.9625	0.0686	1.9649	0.1347	4.9643	7.59E-01	3.7660	0.1022	3.7674
Ambient Wet Bulb Temperature	67		0.2600	2.2924	2.3071	0.0540	1.9649	0.1061	2.3095	5.93E-01	1.3675	0.0629	1.3690
Cooling Tower Wet Bulb Temperature	65		0.2600	0.2904	0.3898	0.0506	1.9649	0.0994	0.4023	1.36E-06	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	-2.41E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0422	0.2044	0.0037	1.9649	0.0073	0.2045	6.78E+01	13.8566	0.4977	13.8656
Economizer Flue Gas Exit Temperature	494	Deg F	2.2410	7.2813	7.6183	0.0345	1.9649	0.0678	7.6186	9.08E-04	0.0069	0.0001	0.0069
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	61	Deg F	2.0000	0.0000	2.0000	0.1083	1.9699	0.2134	2.0114	-6.57E-08	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	92	Deg F	2.0000	0.0000	2.0000	0.1028	1.9699	0.2025	2.0102	6.47E-09	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	494	Deg F	0.0000		0.0000			0.0000	0.0000	-6.47E-03	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	429		8.5731		8.5731			0.0000	8.5731	3.25E+00	27.8730	0.0000	27.8730
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	405		2.0000	0.0000	2.0000	0.1155	1.9699	0.2274	2.0129	-3.44E+00	-6.8710	-0.7814	6.9153
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	310	Deg F	2.0000	0.3075	2.0235	0.0092	1.9649	0.0181	2.0236	4.85E+00	9.8206	0.0880	9.8210
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	106	Deg F	2.0000	0.0000	2.0000	0.0429	1.9699	0.0845	2.0018	1.18E+00	2.3524	0.0994	2.3545
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	-3.55E-07	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	1.31E-07	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0067	1.9699	0.0132	2.1240	2.73E-03	0.0058	0.0000	0.0058
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0301	1.9699	0.0592	2.0009	-1.94E+00	-3.8701	-0.1146	3.8717
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	-1.25E-06	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	-8.15E-08	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	427	Deg F	2.0115	0.0000	2.0115	0.0245	1.9699	0.0483	2.0121	2.52E-08	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0095	1.9699	0.0187	2.0001	-6.83E-01	-1.3657	-0.0127	1.3657
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	7.24E+01	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2643	0.5656	0.0040	1.9649	0.0078	0.5656	-8.27E-05	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0039	0.3000	0.0036	1.9649	0.0071	0.3001	-3.96E+01	-11.8812	-0.2824	11.8846
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0159	0.5003	0.0053	1.9649	0.0105	0.5004	2.87E-05	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	25	ppm	5.0000	0.0249	5.0001	0.1854	1.9649	0.3642	5.0133	-6.49E-07	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	1.94E-08	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	2.43E-08	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-5.52E-01	-1.1033	0.0000	1.1033
Sorbent Temperature	70	Deg F			0.0000			0.0000	0.0000	1.01E-07	0.0000	0.0000	0.0000
Sand Temperature	70	Deg F			0.0000			0.0000	0.0000	-8.18E-08	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	1.02E-03	0.0307	0.0000	0.0307
Fly Ash Temperature	417	Deg F			0.0000			0.0000	0.0000	1.54E-02	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	494	Deg F			0.0000			0.0000	0.0000	9.09E-04	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	310	Deg F			0.0000			0.0000	0.0000	2.87E-04	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.62E+01	10.8742	0.0000	10.8742
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	2.49E+01	26.8838	0.0000	26.8838
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	3.72E+02	262.3576	0.0000	262.3576
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	6.86E+00	0.5375	0.0000	0.5375
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	1.36E+01	0.0797	0.0000	0.0797
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	2.72E+01	5.7759	0.0000	5.7759
Oxygen	25	wt %			0.0000			0.0000	0.0000	-7.72E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	2.60E-06	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-3.09E+02	-92.7941	0.0000	92.7941
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.71E-06	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	6.68E-01	1.1756	0.0000	1.1756
Total Carbon	6	wt %			0.0000			0.0000	0.0000	2.27E-05	0.0000	0.0000	0.0000
Organic Carbon Level	6	wt %			0.0000			0.0000	0.0000	-4.98E-06	0.0000	0.0000	0.0000
Unburned Carbon	6	wt %	0.5605	0.0000	0.5605	1.5950	12.7062	20.2664	20.2741	9.65E+00	5.4065	195.4881	195.5629
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	1.32E-03	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	1.06E-01	0.0106	0.0000	0.0106
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-2.95E-04	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	-2.62E-04	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0350	0.0000	0.0350	0.0000	0.0000	0.0000	0.0350	3.86E-01	0.0135	0.0000	0.0135
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	2.86E-01	0.0286	0.0000	0.0286
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-8.57E-02	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	2.17E-03	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0040	0.0000	0.0040	0.0000	0.0000	0.0000	0.0040	2.75E-01	0.0011	0.0000	0.0011
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-1.03E-01	-0.0002	0.0000	0.0002
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	7.36E-02	0.0029	0.0000	0.0029
Unburned Carbon	0	%			0.0000			0.0000	0.0000	7.00E-02	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,303	kW			0.0000			0.0000	0.0000	-3.16E-08	0.0000	0.0000	0.0000
PA Fans	1,038	kW	10.3770	0.0000	10.3770	0.0000	0.0000	0.0000	10.3770	-4.68E-08	0.0000	0.0000	0.0000
SA Fans	284	kW	2.8360	0.0000	2.8360	0.0000	0.0000	0.0000	2.8360	2.18E-08	0.0000	0.0000	0.0000
ID Fan	2,740	kW	27.4010	0.0000	27.4010	0.0000	0.0000	0.0000	27.4010	-1.19E-09	0.0000	0.0000	0.0000
Recirc Fan	786	kW	7.8620	0.0000	7.8620	0.0000	0.0000	0.0000	7.8620	6.67E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	-2.48E-09	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.1197	0.0000	8.1197	0.0588	1.9699	0.1158	8.1205	-1.22E-04	-0.0010	0.0000	0.0010
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	1.24E-06	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	70	Deg F			0.0000			0.0000	0.0000	-4.72E-08	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9964	0.0000	24.9964	0.1892	1.9699	0.3727	24.9992	8.89E-04	0.0222	0.0003	0.0222
Flue Gas Recirc Flow Rate	186,277	lbm/hr	9313.8490	0.0000	9313.8490	75.8540	1.9699	149.4247	9315.0475	-3.33E-04	-3.0991	-0.0497	3.0995
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	2.86E-08	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	-2.93E-04	-0.0007	0.0000	0.0007

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Net Heat Rate			11,834
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	1.14E-08	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	1.43E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	-5.11E-06	0.0000	0.0000	0.0000
Primary Air Flow Rate	285,389	lbm/h	14,269.47	0.00	14,269.47	155.85	1.97	307.02	14,272.77	1.12E-04	1.6001	0.0344	1.6005
Secondary Air Flow Rate	552,401	lbm/h	27,620.04	0.00	27,620.04	665.39	1.96	1,305.24	27,650.86	-5.82E-05	-1.6081	-0.0760	1.6099
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9765	8.0644	10.6633	0.4123	2.1199	0.8740	10.6990	1.27E-01	1.3520	0.1108	1.3565
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,359	psia	1.9500	0.0000	1.9500	0.2937	1.9649	0.5771	2.0336	2.92E-02	0.0570	0.0169	0.0595
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0104	1.9649	0.0204	0.5504	-1.60E+01	-8.8235	-0.3271	8.8296
Boiler Drum Pressure	1,749	psia	10.0000	0.0000	10.0000	0.4544	1.9699	0.8952	10.0400	8.00E-05	0.0008	0.0001	0.0008
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0102	1.9699	0.0201	2.5001	-5.56E-06	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0116		0.0116	2.0000	7.49E-10	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3801	1.9649	0.7468	1.4992	-3.38E-01	-0.4394	-0.2524	0.5067
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.1013	1.9649	0.1990	0.5849	6.54E+00	3.5978	1.3016	3.8260
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0009	1.9649	0.0018	0.0037	5.45E-04	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0034	1.9699	0.0067	2.5000	-1.18E-03	-0.0030	0.0000	0.0030
Bottom Ash Cooling Water Inlet Temperature	90	Deg F	2.0000	0.0000	2.0000	0.0694	1.9699	0.1368	2.0047	-8.79E-01	-1.7585	-0.1203	1.7626
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	2.17E-03	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	111	Deg F	2.0000	23.4550	23.5401	0.5384	2.1199	1.1413	23.5678	8.79E-01	20.6942	1.0033	20.7185
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	-6.79E-04	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	6.42E-09	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-3.81E+02	-3.8116	0.0000	3.8116
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	4.27E+03	42.7032	0.0000	42.7032
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0311	1.9649	0.0611	0.0892	8.96E+01	5.8218	5.4705	7.9887
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0114	1.9699	0.0224	2.5001	2.69E-09	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0153	1.9699	0.0301	2.0002	5.47E-11	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,424	psia	12.5000	0.0000	12.5000	0.3671	1.9699	0.7231	12.5209	5.25E-13	0.0000	0.0000	0.0000
BFP Outlet Temperature	277	Deg F	2.0000	0.0000	2.0000	0.0155	1.9699	0.0305	2.0002	3.28E-13	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	75	Deg F	2.0000	0.0000	2.0000	0.0042	1.9699	0.0084	2.0000	-1.21E-12	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	384	psia	2.5000	0.0000	2.5000	0.0703	1.9699	0.1385	2.5038	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	370	psia	2.5000	0.0000	2.5000	0.0638	1.9699	0.1256	2.5032	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0111	1.9699	0.0218	2.0001	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	104	Deg F	2.0000	0.0000	2.0000	0.0473	1.9699	0.0931	2.0022	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-3	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.61E+00	-0.1610	0.0000	0.1610
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	1.73E+00	0.1728	0.0000	0.1728
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	4.66E-03	0.0005	0.0000	0.0005
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.83E-09	0.0000	0.0000	0.0000
DI Start Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-3.34E-07	0.0000	0.0000	0.0000
DI End Level	24	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-2.50E-08	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.1028		0.1028	2.0026	-4.53E-10	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0429		0.0429	2.0005	-2.73E-11	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	61	Deg F	2.0000	0.0000	2.0000	0.1083		0.1083	2.0029	-5.97E-12	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0301		0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,359	kW	491.7454	0.0000	491.7454	35.1170	1.9699	69.1768	496.5873	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,415	kW	49.0858	0.0000	49.0858	15.2497	1.9699	30.0404	57.5486	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,943	kW	442.6559	0.0000	442.6559	28.6814	1.9699	56.4994	446.2471	-1.10E-01	-48.7587	-6.2234	49.1543
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	254	kW	1.0907	0.0000	1.0907	7.3152	1.9649	14.3737	14.4151	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	202	kW	10.3460	0.0000	10.3460	0.0000	0.0000	0.0000	10.3460	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	874,752	lbm/hr	8747.5190		8747.5190			0.0000	8747.5190	1.30E-02	113.8153	0.0000	113.8153
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	312.063	195.674	
													-0.06
										Pre-Test Total Corrected Output			368.34
										Uncertainty			3.11%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Boiler Flow			865,979
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 3	2												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0004	0.0033	4.40E-03	0.0000	0.0000	0.0000
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	70	Deg F	0.2600	4.9556	4.9625	0.0686	1.9649	0.1347	4.9643	0.00E+00	0.0000	0.0000	0.0000
Ambient Wet Bulb Temperature	67		0.2600	2.2924	2.3071	0.0540	1.9649	0.1061	2.3095	0.00E+00	0.0000	0.0000	0.0000
Cooling Tower Wet Bulb Temperature	65		0.2600	0.2904	0.3898	0.0506	1.9649	0.0994	0.4023	0.00E+00	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0422	0.2044	0.0037	1.9649	0.0073	0.2045	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	494	Deg F	2.2410	7.2813	7.6183	0.0345	1.9649	0.0678	7.6186	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	61	Deg F	2.0000	0.0000	2.0000	0.1083	1.9699	0.2134	2.0114	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	92	Deg F	2.0000	0.0000	2.0000	0.1028	1.9699	0.2025	2.0102	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	494	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	429		8.5731		8.5731			0.0000	8.5731	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	405		2.0000	0.0000	2.0000	0.1155	1.9699	0.2274	2.0129	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	310	Deg F	2.0000	0.3075	2.0235	0.0092	1.9649	0.0181	2.0236	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	106	Deg F	2.0000	0.0000	2.0000	0.0429	1.9699	0.0845	2.0018	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0067	1.9699	0.0132	2.1240	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0301	1.9699	0.0592	2.0009	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	427	Deg F	2.0115	0.0000	2.0115	0.0245	1.9699	0.0483	2.0121	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0095	1.9699	0.0187	2.0001	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2643	0.5656	0.0040	1.9649	0.0078	0.5656	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0039	0.3000	0.0036	1.9649	0.0071	0.3001	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0159	0.5003	0.0053	1.9649	0.0105	0.5004	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	25	ppm	5.0000	0.0249	5.0001	0.1854	1.9649	0.3642	5.0133	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Sorbent Temperature	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	417	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	494	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	310	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	6	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	6	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	6	wt %	0.5605	0.0000	0.5605	1.5950	12.7062	20.2664	20.2741	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0350	0.0000	0.0350	0.0000	0.0000	0.0000	0.0350	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0040	0.0000	0.0040	0.0000	0.0000	0.0000	0.0040	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,303	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PA Fans	1,038	kW	10.3770	0.0000	10.3770	0.0000	0.0000	0.0000	10.3770	0.00E+00	0.0000	0.0000	0.0000
SA Fans	284	kW	2.8360	0.0000	2.8360	0.0000	0.0000	0.0000	2.8360	0.00E+00	0.0000	0.0000	0.0000
ID Fan	2,740	kW	27.4010	0.0000	27.4010	0.0000	0.0000	0.0000	27.4010	0.00E+00	0.0000	0.0000	0.0000
Recirc Fan	786	kW	7.8620	0.0000	7.8620	0.0000	0.0000	0.0000	7.8620	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.1197	0.0000	8.1197	0.0588	1.9699	0.1158	8.1205	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9964	0.0000	24.9964	0.1892	1.9699	0.3727	24.9992	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	186,277	lbm/hr	9313.8490	0.0000	9313.8490	75.8540	1.9699	149.4247	9315.0475	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Boiler Flow			865,979
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	285,389	lbm/h	14,269.47	0.00	14,269.47	155.85	1.97	307.02	14,272.77	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	552,401	lbm/h	27,620.04	0.00	27,620.04	665.39	1.96	1,305.24	27,650.86	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9765	8.0644	10.6633	0.4123	2.1199	0.8740	10.6990	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,359	psia	1.9500	0.0000	1.9500	0.2937	1.9649	0.5771	2.0336	2.95E+00	5.7494	1.7015	5.9959
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0104	1.9649	0.0204	0.5504	-3.39E+02	-186.5404	-6.9155	186.6686
Boiler Drum Pressure	1,749	psia	10.0000	0.0000	10.0000	0.4544	1.9699	0.8952	10.0400	4.40E-03	0.0440	0.0039	0.0442
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0102	1.9699	0.0201	2.5001	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0116		0.0116	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3801	1.9649	0.7468	1.4992	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.1013	1.9649	0.1990	0.5849	0.00E+00	0.0000	0.0000	0.0000
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0009	1.9649	0.0018	0.0037	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0034	1.9699	0.0067	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	90	Deg F	2.0000	0.0000	2.0000	0.0694	1.9699	0.1368	2.0047	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	111	Deg F	2.0000	23.4550	23.5401	0.5384	2.1199	1.1413	23.5678	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-2.90E+04	-289.9389	0.0000	289.9389
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	3.25E+05	3247.8246	0.0000	3247.8246
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0311	1.9649	0.0611	0.0892	6.81E+03	442.9569	416.2259	607.8279
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0114	1.9699	0.0224	2.5001	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0153	1.9699	0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,424	psia	12.5000	0.0000	12.5000	0.3671	1.9699	0.7231	12.5209	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	277	Deg F	2.0000	0.0000	2.0000	0.0155	1.9699	0.0305	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	75	Deg F	2.0000	0.0000	2.0000	0.0042	1.9699	0.0084	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	384	psia	2.5000	0.0000	2.5000	0.0703	1.9699	0.1385	2.5038	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	370	psia	2.5000	0.0000	2.5000	0.0638	1.9699	0.1256	2.5032	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0111	1.9699	0.0218	2.0001	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	104	Deg F	2.0000	0.0000	2.0000	0.0473	1.9699	0.0931	2.0022	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-3	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.75E+02	-17.5195	0.0000	17.5195
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	1.75E+02	17.5193	0.0000	17.5193
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	24	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.1028		0.1028	2.0026	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0429		0.0429	2.0005	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	61	Deg F	2.0000	0.0000	2.0000	0.1083		0.1083	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0301		0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,359	kW	491.7454	0.0000	491.7454	35.1170	1.9699	69.1768	496.5873	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,415	kW	49.0858	0.0000	49.0858	15.2497	1.9699	30.0404	57.5486	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,943	kW	442.6559	0.0000	442.6559	28.6814	1.9699	56.4994	446.2471	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	254	kW	1.0907	0.0000	1.0907	7.3152	1.9649	14.3737	14.4151	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	202	kW	10.3460	0.0000	10.3460	0.0000	0.0000	0.0000	10.3460	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	874,752	lbm/hr	8747.5190		8747.5190			0.0000	8747.5190	9.90E-01	8660.0438	0.0000	8660.0438
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	9,266.09	416.287	
													-613.86
										Pre-Test Total Corrected Output			9,275.40
										Uncertainty			1.07%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Fuel Heat Input			1,202
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 3	2												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0004	0.0033	-1.63E-01	-0.0005	-0.0001	0.0005
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	1.34E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	8.35E+01	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	70	Deg F	0.2600	4.9556	4.9625	0.0686	1.9649	0.1347	4.9643	7.71E-02	0.3825	0.0104	0.3826
Ambient Wet Bulb Temperature	67		0.2600	2.2924	2.3071	0.0540	1.9649	0.1061	2.3095	6.10E-02	0.1408	0.0065	0.1409
Cooling Tower Wet Bulb Temperature	65		0.2600	0.2904	0.3898	0.0506	1.9649	0.0994	0.4023	1.40E-07	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	-2.44E-01	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0422	0.2044	0.0037	1.9649	0.0073	0.2045	6.98E+00	1.4264	0.0512	1.4274
Economizer Flue Gas Exit Temperature	494	Deg F	2.2410	7.2813	7.6183	0.0345	1.9649	0.0678	7.6186	9.35E-05	0.0007	0.0000	0.0007
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	61	Deg F	2.0000	0.0000	2.0000	0.1083	1.9699	0.2134	2.0114	-6.76E-09	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	92	Deg F	2.0000	0.0000	2.0000	0.1028	1.9699	0.2025	2.0102	6.66E-10	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	494	Deg F	0.0000		0.0000			0.0000	0.0000	-6.57E-04	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	429		8.5731		8.5731			0.0000	8.5731	3.30E-01	2.8306	0.0000	2.8306
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	405		2.0000	0.0000	2.0000	0.1155	1.9699	0.2274	2.0129	-3.49E-01	-0.6978	-0.0794	0.7023
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	310	Deg F	2.0000	0.3075	2.0235	0.0092	1.9649	0.0181	2.0236	5.00E-01	1.0110	0.0091	1.0110
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	106	Deg F	2.0000	0.0000	2.0000	0.0429	1.9699	0.0845	2.0018	1.19E-01	0.2389	0.0101	0.2391
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	-3.65E-08	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	1.33E-08	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0067	1.9699	0.0132	2.1240	2.77E-04	0.0006	0.0000	0.0006
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0301	1.9699	0.0592	2.0009	-1.99E-01	-0.3984	-0.0118	0.3986
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	-1.27E-07	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	-8.39E-09	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	427	Deg F	2.0115	0.0000	2.0115	0.0245	1.9699	0.0483	2.0121	2.60E-09	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0095	1.9699	0.0187	2.0001	-6.93E-02	-0.1387	-0.0013	0.1387
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	7.35E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2643	0.5656	0.0040	1.9649	0.0078	0.5656	-8.40E-06	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0039	0.3000	0.0036	1.9649	0.0071	0.3001	-4.02E+00	-1.2066	-0.0287	1.2069
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0159	0.5003	0.0053	1.9649	0.0105	0.5004	2.92E-06	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	25	ppm	5.0000	0.0249	5.0001	0.1854	1.9649	0.3642	5.0133	-6.59E-08	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	1.97E-09	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	2.46E-09	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	-5.68E-02	-0.1136	0.0000	0.1136
Sorbent Temperature	70	Deg F			0.0000			0.0000	0.0000	1.04E-08	0.0000	0.0000	0.0000
Sand Temperature	70	Deg F			0.0000			0.0000	0.0000	-8.42E-09	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	1.05E-04	0.0032	0.0000	0.0032
Fly Ash Temperature	417	Deg F			0.0000			0.0000	0.0000	1.59E-03	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	494	Deg F			0.0000			0.0000	0.0000	9.35E-05	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	310	Deg F			0.0000			0.0000	0.0000	2.95E-05	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.73E+00	1.1194	0.0000	1.1194
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	2.57E+00	2.7675	0.0000	2.7675
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	3.78E+01	26.6431	0.0000	26.6431
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	7.06E-01	0.0553	0.0000	0.0553
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	1.40E+00	0.0082	0.0000	0.0082
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	2.80E+00	0.5946	0.0000	0.5946
Oxygen	25	wt %			0.0000			0.0000	0.0000	-7.84E-01	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	2.67E-07	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	-3.14E+01	-9.4235	0.0000	9.4235
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	3.82E-07	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	6.88E-02	0.1210	0.0000	0.1210
Total Carbon	6	wt %			0.0000			0.0000	0.0000	2.33E-06	0.0000	0.0000	0.0000
Organic Carbon Level	6	wt %			0.0000			0.0000	0.0000	-5.13E-07	0.0000	0.0000	0.0000
Unburned Carbon	6	wt %	0.5605	0.0000	0.5605	1.5950	12.7062	20.2664	20.2741	9.93E-01	0.5566	20.1242	20.1319
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	1.36E-04	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	1.09E-02	0.0011	0.0000	0.0011
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-3.00E-05	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	-2.67E-05	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0350	0.0000	0.0350	0.0000	0.0000	0.0000	0.0350	3.97E-02	0.0014	0.0000	0.0014
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	2.95E-02	0.0029	0.0000	0.0029
Total Carbon	0	wt %			0.0000			0.0000	0.0000	-8.71E-03	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	2.21E-04	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0040	0.0000	0.0040	0.0000	0.0000	0.0000	0.0040	2.83E-02	0.0001	0.0000	0.0001
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	-1.06E-02	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	7.57E-03	0.0003	0.0000	0.0003
Unburned Carbon	0	%			0.0000			0.0000	0.0000	7.11E-03	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,303	kW			0.0000			0.0000	0.0000	-3.26E-09	0.0000	0.0000	0.0000
PA Fans	1,038	kW	10.3770	0.0000	10.3770	0.0000	0.0000	0.0000	10.3770	-4.75E-09	0.0000	0.0000	0.0000
SA Fans	284	kW	2.8360	0.0000	2.8360	0.0000	0.0000	0.0000	2.8360	2.21E-09	0.0000	0.0000	0.0000
ID Fan	2,740	kW	27.4010	0.0000	27.4010	0.0000	0.0000	0.0000	27.4010	-1.21E-10	0.0000	0.0000	0.0000
Recirc Fan	786	kW	7.8620	0.0000	7.8620	0.0000	0.0000	0.0000	7.8620	6.77E-11	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	-2.52E-10	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.1197	0.0000	8.1197	0.0588	1.9699	0.1158	8.1205	-1.26E-05	-0.0001	0.0000	0.0001
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	1.28E-07	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	70	Deg F			0.0000			0.0000	0.0000	-4.86E-09	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9964	0.0000	24.9964	0.1892	1.9699	0.3727	24.9992	9.15E-05	0.0023	0.0000	0.0023
Flue Gas Recirc Flow Rate	186,277	lbm/hr	9313.8490	0.0000	9313.8490	75.8540	1.9699	149.4247	9315.0475	-3.38E-05	-0.3147	-0.0050	0.3148
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	2.91E-09	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	-3.02E-05	-0.0001	0.0000	0.0001

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Fuel Heat Input			1,202
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,v}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	1.18E-09	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	1.47E-01	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	-5.19E-07	0.0000	0.0000	0.0000
Primary Air Flow Rate	285,389	lbm/h	14,269.47	0.00	14,269.47	155.85	1.97	307.02	14,272.77	1.15E-05	0.1647	0.0035	0.1648
Secondary Air Flow Rate	552,401	lbm/h	27,620.04	0.00	27,620.04	665.39	1.96	1,305.24	27,650.86	-5.99E-06	-0.1655	-0.0078	0.1657
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9765	8.0644	10.6633	0.4123	2.1199	0.8740	10.6990	1.31E-02	0.1392	0.0114	0.1396
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,359	psia	1.9500	0.0000	1.9500	0.2937	1.9649	0.5771	2.0336	3.01E-03	0.0059	0.0017	0.0061
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0104	1.9649	0.0204	0.5504	-1.65E+00	-0.9083	-0.0337	0.9089
Boiler Drum Pressure	1,749	psia	10.0000	0.0000	10.0000	0.4544	1.9699	0.8952	10.0400	8.24E-06	0.0001	0.0000	0.0001
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0102	1.9699	0.0201	2.5001	-5.72E-07	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0116		0.0116	2.0000	7.72E-11	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3801	1.9649	0.7468	1.4992	-3.48E-02	-0.0452	-0.0260	0.0522
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.1013	1.9649	0.1990	0.5849	6.73E-01	0.3704	0.1340	0.3939
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0009	1.9649	0.0018	0.0037	5.61E-05	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0034	1.9699	0.0067	2.5000	-1.20E-04	-0.0003	0.0000	0.0003
Bottom Ash Cooling Water Inlet Temperature	90	Deg F	2.0000	0.0000	2.0000	0.0694	1.9699	0.1368	2.0047	-8.93E-02	-0.1786	-0.0122	0.1790
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	2.20E-04	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	111	Deg F	2.0000	23.4550	23.5401	0.5384	2.1199	1.1413	23.5678	8.93E-02	2.1016	0.1019	2.1040
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	-6.90E-05	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	6.52E-10	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	-3.92E+01	-0.3924	0.0000	0.3924
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	4.40E+02	4.3960	0.0000	4.3960
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0311	1.9649	0.0611	0.0892	9.22E+00	0.5993	0.5631	0.8224
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0114	1.9699	0.0224	2.5001	2.77E-10	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0153	1.9699	0.0301	2.0002	5.63E-12	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,424	psia	12.5000	0.0000	12.5000	0.3671	1.9699	0.7231	12.5209	5.16E-14	0.0000	0.0000	0.0000
BFP Outlet Temperature	277	Deg F	2.0000	0.0000	2.0000	0.0155	1.9699	0.0305	2.0002	4.10E-14	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	75	Deg F	2.0000	0.0000	2.0000	0.0042	1.9699	0.0084	2.0000	-1.51E-13	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	384	psia	2.5000	0.0000	2.5000	0.0703	1.9699	0.1385	2.5038	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	370	psia	2.5000	0.0000	2.5000	0.0638	1.9699	0.1256	2.5032	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0111	1.9699	0.0218	2.0001	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	104	Deg F	2.0000	0.0000	2.0000	0.0473	1.9699	0.0931	2.0022	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-3	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.66E-01	-0.0166	0.0000	0.0166
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	1.78E-01	0.0178	0.0000	0.0178
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	4.80E-04	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-1.89E-10	0.0000	0.0000	0.0000
DI Start Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-3.44E-08	0.0000	0.0000	0.0000
DI End Level	24	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-2.57E-09	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.1028		0.1028	2.0026	-4.66E-11	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0429		0.0429	2.0005	-2.78E-12	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	61	Deg F	2.0000	0.0000	2.0000	0.1083		0.1083	2.0029	-5.60E-13	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0301		0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,359	kW	491.7454	0.0000	491.7454	35.1170	1.9699	69.1768	496.5873	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,415	kW	49.0858	0.0000	49.0858	15.2497	1.9699	30.0404	57.5486	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,943	kW	442.6559	0.0000	442.6559	28.6814	1.9699	56.4994	446.2471	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	254	kW	1.0907	0.0000	1.0907	7.3152	1.9649	14.3737	14.4151	0.00E+00	0.0000	0.0000	0.0000
Manual Auxiliary Loads	202	kW	10.3460	0.0000	10.3460	0.0000	0.0000	0.0000	10.3460	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	874,752	lbm/hr	8747.5190		8747.5190			0.0000	8747.5190	1.34E-03	11.7165	0.0000	11.7165
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	31.375	20.133	
													0.00
										Pre-Test Total Corrected Output			37.28
										Uncertainty			3.10%

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Test Value		Measurement Uncertainty Budget: Systematic			Random			Total	Uncertainty of Test Results: Corrected Auxiliary Load			4,935
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Test 3	2												
Barometric Pressure	15	psia	0.0033	0.0000	0.0033	0.0002	1.9649	0.0004	0.0033	-1.40E-05	0.0000	0.0000	0.0000
Ambient Relative Humidity	1	%	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Specific Humidity	0	lbm H2O/lbm dry air	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ambient Dry Bulb Temperature	70	Deg F	0.2600	4.9556	4.9625	0.0686	1.9649	0.1347	4.9643	0.00E+00	0.0000	0.0000	0.0000
Ambient Wet Bulb Temperature	67		0.2600	2.2924	2.3071	0.0540	1.9649	0.1061	2.3095	0.00E+00	0.0000	0.0000	0.0000
Cooling Tower Wet Bulb Temperature	65		0.2600	0.2904	0.3898	0.0506	1.9649	0.0994	0.4023	0.00E+00	0.0000	0.0000	0.0000
Enthalpy Reference Temperature	77	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas O2	3	%	0.2000	0.0422	0.2044	0.0037	1.9649	0.0073	0.2045	0.00E+00	0.0000	0.0000	0.0000
Economizer Flue Gas Exit Temperature	494	Deg F	2.2410	7.2813	7.6183	0.0345	1.9649	0.0678	7.6186	0.00E+00	0.0000	0.0000	0.0000
Air Heater Data					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average FD Fan Outlet Temperature (SCAH Inlet)	61	Deg F	2.0000	0.0000	2.0000	0.1083	1.9699	0.2134	2.0114	0.00E+00	0.0000	0.0000	0.0000
Average PA Fan Outlet Temperature (SCAH Inlet)	92	Deg F	2.0000	0.0000	2.0000	0.1028	1.9699	0.2025	2.0102	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Gas Temperature (Economizer Outlet)	494	Deg F	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Gas Temperature (Baghouse Inlet)	429		8.5731		8.5731			0.0000	8.5731	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Gas Temperature (SCR Outlet)	405		2.0000	0.0000	2.0000	0.1155	1.9699	0.2274	2.0129	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Gas Temperature (ID Fan Inlet)	310	Deg F	2.0000	0.3075	2.0235	0.0092	1.9649	0.0181	2.0236	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Inlet Air Temperature (SCAH Fan Outlet)	106	Deg F	2.0000	0.0000	2.0000	0.0429	1.9699	0.0845	2.0018	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 1 Exit Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Inlet Air Temperature (Between PA AH 1 and 2)	357		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Primary Air Heater 2 Exit Air Temperature (to Boiler)	442	Deg F	2.1240	0.0000	2.1240	0.0067	1.9699	0.0132	2.1240	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 1 Inlet Air Temperature (SCAH Outlet)	155	Deg F	2.0000	0.0000	2.0000	0.0301	1.9699	0.0592	2.0009	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 2 Exit Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Inlet Air Temperature (Between SA AH 2 and 3)	358		0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Average Secondary Air Heater 3 Exit Air Temperature (to Boiler)	427	Deg F	2.0115	0.0000	2.0115	0.0245	1.9699	0.0483	2.0121	0.00E+00	0.0000	0.0000	0.0000
Average Flue Gas Recirculation Temperature	369		2.0000	0.0000	2.0000	0.0095	1.9699	0.0187	2.0001	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Flue Gas Compostion					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Dry Basis	Dry Basis				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas O2 (Economizer Outlet)	3	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 2 Inlet Flue Gas CO2 (Economizer Outlet)	18	%	0.5000	0.2643	0.5656	0.0040	1.9649	0.0078	0.5656	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas O2 (ID Fan Inlet)	4	%	0.3000	0.0039	0.3000	0.0036	1.9649	0.0071	0.3001	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater 1 Exit Flue Gas CO2 (ID Fan Inlet)	16	%	0.5000	0.0159	0.5003	0.0053	1.9649	0.0105	0.5004	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas CO (ID Fan Inlet)	25	ppm	5.0000	0.0249	5.0001	0.1854	1.9649	0.3642	5.0133	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas NOx (ID Fan Inlet)	155	ppm	5.0000	155.0000	155.0806	155.0000	1.9755	306.2006	343.2329	0.00E+00	0.0000	0.0000	0.0000
Primary Air Heater Exit Flue Gas SOx (ID Fan Inlet)	138	ppm	5.0000	138.0000	138.0906	138.0000	1.9774	272.8855	305.8357	0.00E+00	0.0000	0.0000	0.0000
Ash and Fuel Temperatures					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fuel Temperature	95	Deg F	2.0000		2.0000		0.0000	0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Sorbent Temperature	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sand Temperature	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Temperature	1,500	Deg F	30.0000		30.0000			0.0000	30.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Temperature	417	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Temperature	494	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Temperature	310	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Ultimate Fuel Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Moisture	38	wt %	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	6.68E+01	20.0517	0.0000	20.0517
Carbon	31	wt %	1.0780	0.0000	1.0780	0.0000	0.0000	0.0000	1.0780	0.00E+00	0.0000	0.0000	0.0000
Hydrogen	4	wt %	0.7056	0.0000	0.7056	0.0000	0.0000	0.0000	0.7056	0.00E+00	0.0000	0.0000	0.0000
Nitrogen	0	wt %	0.0784	0.0000	0.0784	0.0000	0.0000	0.0000	0.0784	0.00E+00	0.0000	0.0000	0.0000
Sulfur	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Ash	3	wt %	0.2121	0.0000	0.2121	0.0000	0.0000	0.0000	0.2121	0.00E+00	0.0000	0.0000	0.0000
Oxygen	25	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Chlorine	0	wt %	0.0059	0.0000	0.0059	0.0000	0.0000	0.0000	0.0059	0.00E+00	0.0000	0.0000	0.0000
Sum of Components	100	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Wet High Heating Value, HHV	12	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
Dry High Heating Value, HHV	19	GJ/Tonne	0.3000	0.0000	0.3000	0.0000	0.0000	0.0000	0.3000	0.00E+00	0.0000	0.0000	0.0000
CaO in dry fuel ash	0	wt % ash			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Fly Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Fly Ash in Residue	88	%	1.7600		1.7600			0.0000	1.7600	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	6	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	6	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	6	wt %	0.5605	0.0000	0.5605	1.5950	12.7062	20.2664	20.2741	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Fly Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Economizer Ash in Residue	5		0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0350	0.0000	0.0350	0.0000	0.0000	0.0000	0.0350	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Fly Ash	0	wt %	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Economizer Hopper Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Bottom Ash in Residue	5	%	0.1000		0.1000			0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Total Carbon	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Organic Carbon Level	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	wt %	0.0040	0.0000	0.0040	0.0000	0.0000	0.0000	0.0040	0.00E+00	0.0000	0.0000	0.0000
Mineral Ash Analysis	0	wt %			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Bottom Ash	0	wt %	0.0020		0.0020			0.0000	0.0020	0.00E+00	0.0000	0.0000	0.0000
Heating Value of Bottom Ash		BTU/lb			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Air Heater Hopper Ash Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Percent Air Heater Hopper Ash in Residue	2	%	0.0400		0.0400			0.0000	0.0400	0.00E+00	0.0000	0.0000	0.0000
Unburned Carbon	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
CO2 in Air Heater Hopper Ash	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Urea Analysis					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
% Composition	0	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aux Power					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Total Boiler Aux Load	5,303	kW			0.0000			0.0000	0.0000	9.31E-01	0.0000	0.0000	0.0000
PA Fans	1,038	kW	10.3770	0.0000	10.3770	0.0000	0.0000	0.0000	10.3770	9.31E-01	9.6567	0.0000	9.6567
SA Fans	284	kW	2.8360	0.0000	2.8360	0.0000	0.0000	0.0000	2.8360	9.31E-01	2.6392	0.0000	2.6392
ID Fan	2,740	kW	27.4010	0.0000	27.4010	0.0000	0.0000	0.0000	27.4010	9.31E-01	25.4991	0.0000	25.4991
Recirc Fan	786	kW	7.8620	0.0000	7.8620	0.0000	0.0000	0.0000	7.8620	9.31E-01	7.3163	0.0000	7.3163
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Auxiliary Equipment Power (Crossing Boundary - for Credit Calc)	0	kW			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Overall Auxiliary Power Drive Efficiency	90	%	2.0000		2.0000			0.0000	2.0000	0.00E+00	0.0000	0.0000	0.0000
Misc Flow					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Aqueous ammonia to SCR (19% NH3)	162	lb/hr	8.1197	0.0000	8.1197	0.0588	1.9699	0.1158	8.1205	0.00E+00	0.0000	0.0000	0.0000
Aqueous Ammonia Pressure	30	psia	0.6000		0.6000			0.0000	0.6000	0.00E+00	0.0000	0.0000	0.0000
Temperature of Aqueous Ammonia	70	Deg F			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow to NH3 Vaporizer	500	scfm	24.9964	0.0000	24.9964	0.1892	1.9699	0.3727	24.9992	0.00E+00	0.0000	0.0000	0.0000
Flue Gas Recirc Flow Rate	186,277	lbm/hr	9313.8490	0.0000	9313.8490	75.8540	1.9699	149.4247	9315.0475	0.00E+00	0.0000	0.0000	0.0000
Limestone Flow Rate	28,409	lbm/h	568.1800		568.1800			0.0000	568.1800	0.00E+00	0.0000	0.0000	0.0000
Sand Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sodium Bicarbonate Flow Rate	120	lbm/h	2.4000		2.4000			0.0000	2.4000	0.00E+00	0.0000	0.0000	0.0000

FAGEN GAINESVILE RENEWABLE ENERGY CENTER PLANT TEST UNCERTAINTY

PRE-TEST (Absolute Basis) (95% Confidence Level)	Measurement Uncertainty Budget									Uncertainty of Test Results			
	Test Value		Systematic			Random			Total	Corrected Auxiliary Load			4,935
	Mean, $\bar{X}$	Units	B_{inst} Instrument Systematic Uncertainty	$B_{spatial}$ Spatial Systematic Uncertainty	$U_{95,SYS}$ Overall Systematic Uncertainty	$S_{\bar{X}}$ Standard Deviation of the Mean	$t_{95,\nu}$ Student's t	$U_{95,RAND}$ Random Uncertainty	$U_{95,TOT}$ Total Measurement Uncertainty	θ Absolute Sensitivity	$U_{P1,SYS}$ [kW] Systematic Uncertainty of Corrected Power	$U_{P1,RAND}$ [kW] Random Uncertainty of Corrected Power	U_{P1} [kW] Total Uncertainty of Corrected Power
Ash Flow Basis - by Split or Measured Bottom Ash	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Flow Rate	75,000	lbm/h	1500.0000		1500.0000			0.0000	1500.0000	0.00E+00	0.0000	0.0000	0.0000
Air Flow Rate Basis - Measure or Assume with Air Fraction	Assume				0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate Air Fraction	34	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate Air Fraction	66	%			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Flow Rate	285,389	lbm/h	14,269.47	0.00	14,269.47	155.85	1.97	307.02	14,272.77	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Flow Rate	552,401	lbm/h	27,620.04	0.00	27,620.04	665.39	1.96	1,305.24	27,650.86	0.00E+00	0.0000	0.0000	0.0000
Urea Flow Rate	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Atomizing Steam	0	lbm/h	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Sootblowing Steam	0	lbm/h	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR BOILER OUTPUT AND HEAT RATE					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Continuous Blowdown Flash Tank to Blowdown Tank	0	lbm/hr	0.0000	0.0000	0.0000	0.0000	1.9699	0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Flow Rate	140	gpm	6.9765	8.0644	10.6633	0.4123	2.1199	0.8740	10.6990	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Economizer Feedwater Inlet Pressure	2,359	psia	1.9500	0.0000	1.9500	0.2937	1.9649	0.5771	2.0336	-5.09E-03	-0.0099	-0.0029	0.0104
Economizer Feedwater Inlet Temperature	439	Deg F	0.5500		0.5500	0.0104	1.9649	0.0204	0.5504	2.79E+00	1.5361	0.0569	1.5371
Boiler Drum Pressure	1,749	psia	10.0000	0.0000	10.0000	0.4544	1.9699	0.8952	10.0400	-1.40E-05	-0.0001	0.0000	0.0001
Boiler Continuous Blowdown Flash Tank Pressure	44	psia	2.5000	0.0000	2.5000	0.0102	1.9699	0.0201	2.5001	0.00E+00	0.0000	0.0000	0.0000
Extraction to DA Temperature (SCAH Steam Inlet)	274	Deg F	2.0000	0.0000	2.0000	0.0116		0.0116	2.0000	0.00E+00	0.0000	0.0000	0.0000
Boiler HP Steam Outlet Pressure	1,619	psia	1.3000		1.3000	0.3801	1.9649	0.7468	1.4992	5.88E-02	0.0765	0.0439	0.0882
Boiler HP Steam Outlet Temperature	999	Deg F	0.5500		0.5500	0.1013	1.9649	0.1990	0.5849	-1.14E+00	-0.6263	-0.2266	0.6661
Turbine Exhaust Pressure	1	psia	0.0033	0.0000	0.0033	0.0009	1.9649	0.0018	0.0037	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Pressure	63	psia	2.5000	0.0000	2.5000	0.0034	1.9699	0.0067	2.5000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Inlet Temperature	90	Deg F	2.0000	0.0000	2.0000	0.0694	1.9699	0.1368	2.0047	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Pressure	63	psia			0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Bottom Ash Cooling Water Outlet Temperature	111	Deg F	2.0000	23.4550	23.5401	0.5384	2.1199	1.1413	23.5678	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
SCAH Steam Quality	1	%	0.0198		0.0198			0.0000	0.0198	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Brine System Extraction Flow	3,000	lb/hr	60.0000		60.0000			0.0000	60.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Pipe Diameter	10	in	0.0100		0.0100			0.0000	0.0100	6.63E+01	0.6634	0.0000	0.6634
Feedwater Flow Throat Diameter	6	in	0.0100		0.0100			0.0000	0.0100	-7.43E+02	-7.4310	0.0000	7.4310
Feedwater Flow Differential Pressure Tap 1	64	inH2O	0.0650	0.0000	0.0650	0.0311	1.9649	0.0611	0.0892	-1.56E+01	-1.0135	-0.9523	1.3907
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Pressure	76	psia	2.5000	0.0000	2.5000	0.0114	1.9699	0.0224	2.5001	0.00E+00	0.0000	0.0000	0.0000
BFP Inlet Temperature	273	Deg F	2.0000	0.0000	2.0000	0.0153	1.9699	0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Pressure	2,424	psia	12.5000	0.0000	12.5000	0.3671	1.9699	0.7231	12.5209	0.00E+00	0.0000	0.0000	0.0000
BFP Outlet Temperature	277	Deg F	2.0000	0.0000	2.0000	0.0155	1.9699	0.0305	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Make-up Temperature	75	Deg F	2.0000	0.0000	2.0000	0.0042	1.9699	0.0084	2.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
First Extraction Pressure From Turbine	384	psia	2.5000	0.0000	2.5000	0.0703	1.9699	0.1385	2.5038	0.00E+00	0.0000	0.0000	0.0000
Extraction Pressure Into HPFWH2	370	psia	2.5000	0.0000	2.5000	0.0638	1.9699	0.1256	2.5032	0.00E+00	0.0000	0.0000	0.0000
FW Temperature Into HPFWH2	372	Deg F	2.0000	0.0000	2.0000	0.0111	1.9699	0.0218	2.0001	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Hotwell Temperature	104	Deg F	2.0000	0.0000	2.0000	0.0473	1.9699	0.0931	2.0022	0.00E+00	0.0000	0.0000	0.0000
Hotwell Start Level	-4	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Hotwell End Level	-3	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
Boiler Drum Start Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	5.58E-01	0.0558	0.0000	0.0558
Boiler Drum End Level	0	in	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	-5.58E-01	-0.0558	0.0000	0.0558
DA Start Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DA End Level	55	%	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI Start Level	25	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
DI End Level	24	ft	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Primary Air Inlet Temperature	92	Deg F	2.0000	0.0000	2.0000	0.1028		0.1028	2.0026	0.00E+00	0.0000	0.0000	0.0000
Primary Air Outlet Temperature	106	Deg F	2.0000	0.0000	2.0000	0.0429		0.0429	2.0005	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Inlet Temperature	61	Deg F	2.0000	0.0000	2.0000	0.1083		0.1083	2.0029	0.00E+00	0.0000	0.0000	0.0000
Secondary Air Outlet Temperature	155	Deg F	2.0000	0.0000	2.0000	0.0301		0.0301	2.0002	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
PRIMARY VARIABLES FOR PTC46 Test Calculations					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Gross Power	114,359	kW	491.7454	0.0000	491.7454	35.1170	1.9699	69.1768	496.5873	0.00E+00	0.0000	0.0000	0.0000
Plant Auxiliary Power	11,415	kW	49.0858	0.0000	49.0858	15.2497	1.9699	30.0404	57.5486	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Output	102,943	kW	442.6559	0.0000	442.6559	28.6814	1.9699	56.4994	446.2471	0.00E+00	0.0000	0.0000	0.0000
Plant Net Power Factor	1	-	0.0043	0.9941	0.9941	0.9941	0.0000	0.0000	0.9941	0.00E+00	0.0000	0.0000	0.0000
Material Handling System Auxiliary Load	254	kW	1.0907	0.0000	1.0907	7.3152	1.9649	14.3737	14.4151	9.31E-01	1.0150	13.3761	13.4145
Manual Auxiliary Loads	202	kW	10.3460	0.0000	10.3460	0.0000	0.0000	0.0000	10.3460	9.31E-01	9.6279	0.0000	9.6279
					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
INTERMEDIATE CALCULATIONS					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Water and Steam Flows					0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
Feedwater Flow Rate	874,752	lbm/hr	8747.5190		8747.5190			0.0000	8747.5190	-2.27E-03	-19.8142	0.0000	19.8142
Boiler CBD Flow Rate	0	lbm/hr	0.0000		0.0000			0.0000	0.0000	0.00E+00	0.0000	0.0000	0.0000
										RSS	41.855	13.412	
													1231.07
										Pre-Test Total Corrected Output			56.24
										Uncertainty			1.14%

FAGEN GAINESVILLE PLANT TEST UNCERTAINTY ANALYSIS SUMMARY						
DESCRIPTION	**Electrical Output**			**Cycle Heat Rate**		
	kW	***U_{SYS}***	***U_P***	**Btu/kWh**	***U_{SYS}***	***U_{HR}***
Plant Unit Testing						
Corrected Result Test Run 1	101,325	446.19	450	11,605	312.33	312
Corrected Result Test Run 2	101,431	449.33	453	11,560	312.81	430
Corrected Result Test Run 3	101,037	454.51	458	11,616	312.06	368
Average Corrected Result, R_{Ave}	101,264			11,594		
Standard Deviation of Result, S_R	117.56			17.27		
Systematic Uncertainty of Result, B_R		450.01			312.40	
Test Avg Uncertainty, U_P and U_{HR}			**508**			**314**
			0.50%			**2.71%**
Boiler Unit Testing	**Boiler Flow**			**Fuel Heat Input**		
	lbm/hr	***U_{SYS}***	***U_P***	**mmBTU/hr**	***U_{SYS}***	***U_{HR}***
Corrected Result Test Run 1	870,046	9,309.03	9,315.06	1,206	31.45	31
Corrected Result Test Run 2	870,397	9,312.49	9,318.58	1,207	31.51	44
Corrected Result Test Run 3	865,979	9,266.09	9,275.40	1,202	31.37	37
Average Corrected Result, R_{Ave}	868,807			1,205		
Standard Deviation of Result, S_R	1,417.81			1.72		
Systematic Uncertainty of Result, B_R		9,295.87			31.44	
Test Avg Uncertainty, U_P and U_{HR}			**9,719**			**32**
			1.12%			**2.62%**
Boiler Unit Testing	**Auxiliary Load**					
	kW	***U_{SYS}***	***U_P***			
Corrected Result Test Run 1	5,089	42.38	55			
Corrected Result Test Run 2	5,071	42.15	55			
Corrected Result Test Run 3	4,935	41.85	56			
Average Corrected Result, R_{Ave}	5,031					
Standard Deviation of Result, S_R	48.57					
Systematic Uncertainty of Result, B_R		42.13				
Test Avg Uncertainty, U_P and U_{HR}			**106**			
			2.10%			

APPENDIX E

Fuel and Ash Analysis

1641 Sigman Road
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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123912	**Sample Weight (kg):**	7.32
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Test 1- Start 10:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123912-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.62		CEN/EN 14774-1
Ash (%) - 815 C	3.04	4.87	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (MJ/kg)	12.05	19.32	CEN/EN 14918
Net Calorific Value (cV)(MJ/kg)	10.46	18.15	CEN/EN 14918
Net Calorific Value (cP)(MJ/kg)	10.36	18.09	CEN/EN 14918
Carbon (%)	30.39	48.72	CEN/EN 15104
Hydrogen (%)	3.53	5.66	CEN/EN 15104
Nitrogen (%)	0.24	0.39	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.17	40.35	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh

BEL ID Number:	BEL123912	**Sample Weight (kg):**	7.32
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Test 1- Start 10:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123912-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	153.0	mg/kg	
Calcium (Ca)	6130	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	104	mg/kg	
Lead (Pb)	0.43	mg/kg	
Magnesium (Mg)	588.3	mg/kg	
Manganese (Mn)	71.3	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	479	mg/kg	
Potassium (K)	1691	mg/kg	
Silica (Si)	6936	mg/kg	
Sodium (Na)	120	mg/kg	
Titanium (Ti)	7.8	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1230	
Deformation Temperature (DT)	1240	
Hemispherical Temperature (HT)	1270	
Flow Temperature (FT)	1280	

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hallibaugh@mchale.org

BEL ID Number(s):	BEL123913	**Sample Weight (kg):**	5.46
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Test 2- Start 14:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123913-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.27		CEN/EN 14774-1
Ash (%)	2.85	4.55	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.13	19.33	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.54	18.17	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.45	18.10	CEN/EN 14918
Carbon (%)	30.67	48.89	CEN/EN 15104
Hydrogen (%)	3.53	5.63	CEN/EN 15104
Nitrogen (%)	0.23	0.36	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.44	40.55	By Difference
Chlorine (%)	0.008	0.012	CEN/EN 15289
Fluorine (ppm)	<5.0	<5.0	CEN/EN 15289

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hallibaugh@mchale.org

BEL ID Number(s):	BEL123914	**Sample Weight (kg):**	7.28
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Test 3- Start 18:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123914-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.83		CEN/EN 14774-1
Ash (%)	2.59	4.17	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.01	19.32	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.39	18.12	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.30	18.05	CEN/EN 14918
Carbon (%)	30.84	49.61	CEN/EN 15104
Hydrogen (%)	3.62	5.82	CEN/EN 15104
Nitrogen (%)	0.23	0.38	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	24.88	40.02	By Difference
Chlorine (%)	0.007	0.012	CEN/EN 15289
Fluorine (ppm)	<5.0	<5.0	CEN/EN 15289

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123915	**Sample Weight (kg):**	4.65/4.36
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 10:00 AM	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123915-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	38.33		CEN/EN 14774-1
Ash (%)	2.34	3.79	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.02	19.49	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.41	18.31	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.31	18.24	CEN/EN 14918
Carbon (%)	30.35	49.21	CEN/EN 15104
Hydrogen (%)	3.55	5.76	CEN/EN 15104
Nitrogen (%)	0.22	0.36	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.20	40.87	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
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Company Contact: James Hollibaugh

BEL ID Number:	BEL123915	**Sample Weight (kg):**	4.65/4.36
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 10:00 AM	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123915-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	134.0	mg/kg	
Calcium (Ca)	6020	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	97	mg/kg	
Lead (Pb)	0.38	mg/kg	
Magnesium (Mg)	597.6	mg/kg	
Manganese (Mn)	70.6	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	523	mg/kg	
Potassium (K)	1721	mg/kg	
Silica (Si)	6687	mg/kg	
Sodium (Na)	130	mg/kg	
Titanium (Ti)	6.3	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1240	
Deformation Temperature (DT)	1250	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123917	**Sample Weight (kg):**	3.96/3.84
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 11:00 AM	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123917-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	38.00		CEN/EN 14774-1
Ash (%)	2.21	3.57	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.19	19.66	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.57	18.46	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.48	18.39	CEN/EN 14918
Carbon (%)	30.64	49.42	CEN/EN 15104
Hydrogen (%)	3.60	5.81	CEN/EN 15104
Nitrogen (%)	0.23	0.38	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.31	40.82	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
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Company Contact: James Hollibaugh

BEL ID Number:	BEL123917	**Sample Weight (kg):**	3.96/3.84
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 11:00 AM	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123917-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	104.2	mg/kg	
Calcium (Ca)	5470	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	87	mg/kg	
Lead (Pb)	2.45	mg/kg	
Magnesium (Mg)	589.9	mg/kg	
Manganese (Mn)	75.1	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	505	mg/kg	
Potassium (K)	1668	mg/kg	
Silica (Si)	6877	mg/kg	
Sodium (Na)	120	mg/kg	
Titanium (Ti)	5.1	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1220	
Deformation Temperature (DT)	1240	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123919	**Sample Weight (kg):**	4.02/3.52
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 12:00 PM	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123919-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.74		CEN/EN 14774-1
Ash (%)	2.39	3.83	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.04	19.33	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.42	18.13	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.33	18.06	CEN/EN 14918
Carbon (%)	30.70	49.31	CEN/EN 15104
Hydrogen (%)	3.63	5.83	CEN/EN 15104
Nitrogen (%)	0.20	0.32	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.34	40.69	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh

BEL ID Number:	BEL123919	**Sample Weight (kg):**	4.02/3.52
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 12:00 PM	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123919-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	125.5	mg/kg	
Calcium (Ca)	5760	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	110	mg/kg	
Lead (Pb)	0.51	mg/kg	
Magnesium (Mg)	602.5	mg/kg	
Manganese (Mn)	79.7	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	512	mg/kg	
Potassium (K)	1750	mg/kg	
Silica (Si)	6693	mg/kg	
Sodium (Na)	120	mg/kg	
Titanium (Ti)	6.1	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1240	
Deformation Temperature (DT)	1250	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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Report of Analysis

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18378 Redmond Way
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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123921	**Sample Weight (kg):**	3.99/3.35
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 13:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123921-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.37		CEN/EN 14774-1
Ash (%)	2.06	3.28	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.09	19.30	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.47	18.09	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.37	18.02	CEN/EN 14918
Carbon (%)	30.81	49.19	CEN/EN 15104
Hydrogen (%)	3.67	5.85	CEN/EN 15104
Nitrogen (%)	0.20	0.32	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.89	41.34	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh

BEL ID Number:	BEL123921	**Sample Weight (kg):**	3.99/3.35
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 13:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123921-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	82.7	mg/kg	
Calcium (Ca)	5180	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	82	mg/kg	
Lead (Pb)	0.33	mg/kg	
Magnesium (Mg)	560.5	mg/kg	
Manganese (Mn)	64.0	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	489	mg/kg	
Potassium (K)	1703	mg/kg	
Silica (Si)	5296	mg/kg	
Sodium (Na)	120	mg/kg	
Titanium (Ti)	7.2	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1240	
Deformation Temperature (DT)	1250	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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Report of Analysis

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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123924	**Sample Weight (kg):**	3.85/4.28
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	14:12	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123924-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.81		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.21	19.63	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123925	**Sample Weight (kg):**	3.98/4.52
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	14:36	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123925-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.91		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	11.82	19.04	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123926	**Sample Weight (kg):**	4.24/4.20
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 15:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123926-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.71		CEN/EN 14774-1
Ash (%)	2.14	3.44	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.00	19.27	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.40	18.09	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.30	18.02	CEN/EN 14918
Carbon (%)	30.55	49.04	CEN/EN 15104
Hydrogen (%)	3.58	5.75	CEN/EN 15104
Nitrogen (%)	0.25	0.40	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.76	41.35	By Difference

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Company Contact: James Hollibaugh

BEL ID Number:	BEL123926	**Sample Weight (kg):**	4.24/4.20
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 15:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123926-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	124.1	mg/kg	
Calcium (Ca)	5250	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	77	mg/kg	
Lead (Pb)	0.30	mg/kg	
Magnesium (Mg)	556.2	mg/kg	
Manganese (Mn)	70.9	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	488	mg/kg	
Potassium (K)	1608	mg/kg	
Silica (Si)	4403	mg/kg	
Sodium (Na)	<100	mg/kg	
Titanium (Ti)	6.1	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1230	
Deformation Temperature (DT)	1250	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123928	**Sample Weight (kg):**	3.97/4.12
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 16:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123928-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.31		CEN/EN 14774-1
Ash (%)	2.10	3.35	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.11	19.32	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.49	18.11	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.40	18.04	CEN/EN 14918
Carbon (%)	30.72	49.01	CEN/EN 15104
Hydrogen (%)	3.67	5.85	CEN/EN 15104
Nitrogen (%)	0.19	0.31	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	26.00	41.47	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
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Company Contact: James Hollibaugh

BEL ID Number:	BEL123928	**Sample Weight (kg):**	3.97/4.12
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 16:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123928-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	123.1	mg/kg	
Calcium (Ca)	5140	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	83	mg/kg	
Lead (Pb)	0.38	mg/kg	
Magnesium (Mg)	567.1	mg/kg	
Manganese (Mn)	77.8	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	499	mg/kg	
Potassium (K)	1666	mg/kg	
Silica (Si)	5611	mg/kg	
Sodium (Na)	130	mg/kg	
Titanium (Ti)	6.1	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1240	
Deformation Temperature (DT)	1240	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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Report of Analysis

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18378 Redmond Way
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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123930	**Sample Weight (kg):**	3.84/4.01
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 17:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123930-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	38.11		CEN/EN 14774-1
Ash (%)	1.99	3.21	CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.23	19.76	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)	10.61	18.56	CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)	10.51	18.49	CEN/EN 14918
Carbon (%)	30.55	49.36	CEN/EN 15104
Hydrogen (%)	3.60	5.81	CEN/EN 15104
Nitrogen (%)	0.24	0.39	CEN/EN 15104
Sulfur (%)	0.01	0.01	CEN/EN 15289
Oxygen (%)	25.51	41.21	By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh

BEL ID Number:	BEL123930	**Sample Weight (kg):**	3.84/4.01
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	Time 17:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123930-1
Seal Code:	11/21/2013	**Purchase Order #**	N/A

Major and Minor Elements:

Analyte	Dry Basis	Units	CEN/EN 15297
Aluminum (Al)	136.1	mg/kg	
Calcium (Ca)	4880	mg/kg	
Chromium (Cr)	<5.0	mg/kg	
Iron (Fe)	82	mg/kg	
Lead (Pb)	0.31	mg/kg	
Magnesium (Mg)	541.9	mg/kg	
Manganese (Mn)	72.8	mg/kg	
Mercury (Hg)	<0.020	mg/kg	
Phosphorus (P)	481	mg/kg	
Potassium (K)	1568	mg/kg	
Silica (Si)	5139	mg/kg	
Sodium (Na)	<100	mg/kg	
Titanium (Ti)	5.2	mg/kg	

Analysis of Ash: Ash Fusion Temperatures/Mineral Ash Analysis

Ash Fusion Property	Oxidizing (°C)	ISO 540
Shrinkage Starting Temperature (SST)	1240	
Deformation Temperature (DT)	1250	
Hemispherical Temperature (HT)	1260	
Flow Temperature (FT)	1270	

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123934	**Sample Weight (kg):**	4.69/4.59
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	19:24	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123934-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.48		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.14	19.41	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

Prepared By: Chris Wiberg

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Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123935	**Sample Weight (kg):**	4.29/3.51
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	20:00	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123935-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.41		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.28	19.61	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
james.hallibaugh@mchale.org

BEL ID Number(s):	BEL123936	**Sample Weight (kg):**	3.61/4.40
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	20:36	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123936-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	38.48		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	11.95	19.42	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123937	**Sample Weight (kg):**	3.97/3.83
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	21:12	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123937-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	36.86		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.15	19.24	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123938	**Sample Weight (kg):**	4.74/4.02
Product/Commodity:	Woody Biomass	**Sample Received:**	11/24/2013
Sample Designation:	21:48	**Report Date:**	12/3/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123938-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Compositional Analysis: Proximate/Ultimate Analysis

Parameter	As-Received	Oven Dry	Analytical Method
Total Moisture (%)	37.02		CEN/EN 14774-1
Ash (%)			CEN/EN 14775
Volatiles (%)			CEN/EN 15148
Fixed Carbon (%)			By Difference
Gross Calorific Value (GJ/Tonne)	12.23	19.41	CEN/EN 14918
Net Calorific Value (cV)(GJ/Tonne)			CEN/EN 14918
Net Calorific Value (cP)(GJ/Tonne)			CEN/EN 14918
Carbon (%)			CEN/EN 15104
Hydrogen (%)			CEN/EN 15104
Nitrogen (%)			CEN/EN 15104
Sulfur (%)			CEN/EN 15289
Oxygen (%)			By Difference

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123939	**Sample Weight (kg):**	0.03
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	11:55 BOTTOM ASH GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123939-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.09		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.13	0.13	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123940-2	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	12:22 ECON GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123940-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.14		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.21	0.21	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	0.49	0.49	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123941	**Sample Weight (kg):**	0.07
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	12:30 3 PASS GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123941-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.06		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-0.43	-0.43	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123942-2	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	13:00 BAGHOUSE GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123942-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.16		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-2.64	-2.65	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	7.76	7.78	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123943	**Sample Weight (kg):**	0.04
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	14:35 BOTTOM ASH GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123943-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.10		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.16	0.16	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123944-2	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	14:40 ECON GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123944-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.06		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.24	0.25	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	0.59	0.59	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123945-2	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	15:39 BAGHOUSE GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123945-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.13		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-1.59	-1.59	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	9.03	9.04	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123946	**Sample Weight (kg):**	0.06
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	15:47 3 PASS GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123946-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.02		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-0.23	-0.23	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123947-2	**Sample Weight (kg):**	0.12
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	16:55 BAGHOUSE GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123947-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	<0.01		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-1.10	-1.10	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	4.70	4.70	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123948	**Sample Weight (kg):**	0.04
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	17:23 BOTTOM ASH GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123948-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.01		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.02	0.02	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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BEL ID Number(s):	BEL123949-2	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	17:33 ECON GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123949-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.04		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.17	0.17	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	0.45	0.45	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123950	**Sample Weight (kg):**	0.04
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	17:45 3 PASS GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123950-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.04		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-0.15	-0.15	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
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BEL ID Number(s):	BEL123951-2	**Sample Weight (kg):**	0.11
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	19:00 BAGHOUSE GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123951-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	<0.01		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-2.87	-2.87	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	7.20	7.20	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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1641 Sigman Road
PO Box 919
Conyers, GA 30012
1-770-922-8000 ext 164
www.biomassenergylab.com

Report of Analysis

McHale & Associates Inc.
18378 Redmond Way
Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123952	**Sample Weight (kg):**	0.05
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	20:55 3 PASS GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123952-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	<0.01		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-0.40	-0.40	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Redmond WA 98052

Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123953	**Sample Weight (kg):**	0.04
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	20:36 BOTTOM ASH GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123953-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	<0.01		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.04	0.04	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123954-2	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	20:40 ECON GREC	**Report Date:**	12/9/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123954-2
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	0.02		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	0.10	0.10	ASTM D7348 (Method A)
Loss On Ignition (%) - 750 C	0.35	0.35	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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Report of Analysis

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Company Contact: James Hollibaugh
james.hollibaugh@mchale.org

BEL ID Number(s):	BEL123955	**Sample Weight (kg):**	0.08
Product/Commodity:	ASH	**Sample Received:**	11/24/2013
Sample Designation:	21:18 BAGHOUSE GREC	**Report Date:**	12/5/2013
Packaging:	Plastic Bag	**Report ID:**	BEL123955-1
Date Sampled:	11/21/2013	**Purchase Order #**	N/A

Physical Properties of Ash

Parameter	As Received	Dry Basis	Analytical Method
Total Moisture %	<0.01		ASTM D7348 (Method A - 2 step)
Loss On Ignition (%) - 550 C	-1.02	-1.02	ASTM D7348 (Method A)

Prepared By: Chris Wiberg

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