Rayonier

Performance Fibers

Fernandina Mill

June 9, 2009

Certified Main, Return Receipt Requested

Mr. Jeffery Koerner, P.E.
Florida Dept. of Environmental Protection
Bureau of Air Regulation
Division of Air Resource Management
2600 Blair Stone Road, M.S. 5505
Tallahassee, FL 32399-2400

Re: Rayonier Permit No. 0890004-021-AC
Follow-up Test Results on No. 6 Power Boiler while Burning Wastewater Treatment Solids

Attached are the results of the follow-up testing to the screening testing of the #6 power boiler while burning wastewater treatment solids. This test was conducted under the authority of Air Permit No. 0890004-021-AC Section G and under the Extension of this permit dated February 5, 2009. This testing was conducted only for particulate matter as the previous round of testing indicated acceptable results for all other tested parameters.

As indicated in the attached test report that includes the test program and procedures used, the data collection system, the tested configurations, and the analytical results; this test demonstrated the capability of the power boiler to operate well within its particulate matter emission permit limits while firing up to 60 ODTD of wastewater treatment solids at approximately 30% solids while producing approximately 280,000 #/hour of steam. The emissions impacts of the previous testing and this round of testing are currently being summarized in a construction permit application requesting the ability to burn wastewater treatment solids on a continuous basis in the #6 power boiler.

If you have any questions regarding the testing program, please contact me at 904-277-1346 or david.rogers@rayonier.com.

Sincerely,

David W. Rogers
Manager, Environmental Operations

cc: Mr. Ray Barata, FDEP Jacksonville

Work Order No. 05565.008.010

BFB Boiler
Particulate Matter
Emission Test Report
Rayonier
Fernandina Beach, Florida
15-16 April 2009

Prepared For

RAYONIER
Foot of Gum Street
Fernandina Beach, Florida 31598-2070

Gregory R. Sims
Senior Project Manager
Approved for Transmittal

Natalie Vaught
Report Coordinator
Approved for Transmittal

Prepared By

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6 May 2009

WESTON SOLUTIONS, INC. (WESTON®)
EMISSION TESTING PRACTICE – AUBURN OPERATIONS
ACCREDITATION STIPULATION

Laboratory:	Weston Solutions, Inc.
Accreditor(s):	Louisiana Environmental Laboratory Accreditation Program (LELAP) – Laboratory and Emission Testing Practice
Accreditation ID:	LELAP – 03024
Scope:	Particulate Matter Sampling and Analysis
Effective:	LELAP – 21 December 2001
Expires:	LELAP – 30 June 2009

Note: These accreditation stipulations conform to the requirements of Georgia Rule 391-3-26-01.

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LIST OF TABLES

SECTION 1
INTRODUCTION

Weston Solutions, Inc. (WESTON®) was retained by Rayonier to conduct particulate matter (PM) emission testing on the Bubbling Fluidized Bed (BFB) Boiler at the mill in Fernandina Beach, Florida. The emission test results included from this study are for Rayonier's internal use only and not for demonstrating compliance with any regulation requirements or permit conditions.

WESTON performed the emission testing during 15-16 April 2009. The project team included the following individuals.

Name	Project Role
Gregory Sims	Project Manager/Technical Director
Melanie Wright	Quality Assurance Manager
William Routhier	Test Team Leader
Susan Brown	Test Team Member
Natalie Vaught	Report Coordinator

Mr. David Rogers of Rayonier coordinated the testing with facility operations and served as WESTON's technical contact throughout the effort.

The Louisiana Environmental Laboratory Accreditation Program (LELAP) accredits WESTON's emission testing practice. The stipulation associated with this accrediting authority precedes the table of contents of this report.

SECTION 2
RESULTS AND DISCUSSION

Table 2-1 presents a summary of the emission testing results, and Tables 2-2 and 2-3 present detailed summaries of the emission testing results. Any differences between the calculated results in the appendices and the reported results in the summary tables are due to rounding the results for presentation.

TABLE 2-1
SUMMARY OF EMISSION TEST RESULTS

	Condition One (Bark w/45 ODTD Sludge)	Condition Two (Bark w/60 ODTD Sludge)
Particulate Matter		
lb/hr	18	15
lb/MMBtu	0.037	0.032

TABLE 2-2
BFB BOILER
CONDITION ONE
BARK WITH 45 ODTD SLUDGE
SUMMARY OF PM EMISSION RESULTS

	Run 1	Run 2	Run 3	Mean
Date	4/15/09	4/15/09	4/15/09	----
Time Began	1157	1347	1535	----
Time Ended	1303	1455	1642	----
Stack Gas Data				
Temperature, °F	367	371	371	370
Velocity, ft/sec	50	50	48	49
Moisture, %	22	21	20	21
CO_2 Concentration, %	13.2	13.2	13.1	13.2
O_2 Concentration, %	6.9	7.0	6.9	6.9
VFR, x 10^5 dscfm	1.17	1.19	1.13	1.16
Particulate Matter				
Isokinetic Sampling Rate, %	100	98	97	98
Concentration, gr/dscf	0.016	0.017	0.020	0.018
Emission Rate, lb/hr	16	18	19	18
Emission Factor, lb/MMBtu	0.034	0.035	0.041	0.037

TABLE 2-3
BFB BOILER
CONDITION TWO
BARK WITH 60 ODTD SLUDGE
SUMMARY OF PM EMISSION RESULTS

	Run 1	Run 2	Run 3	Mean
Date	4/16/09	4/16/09	4/16/09	----
Time Began	0922	1100	1239	----
Time Ended	1030	1207	1346	----
Stack Gas Data				
Temperature, °F	374	369	363	369
Velocity, ft/sec	50	49	48	49
Moisture, %	22	21	22	22
CO_2 Concentration, %	13.1	13.2	13.2	13.2
O_2 Concentration, %	7.1	6.9	6.9	7.0
VFR, x 10^5 dscfm	1.15	1.17	1.14	1.15
Particulate Matter				
Isokinetic Sampling Rate, %	100	100	101	100
Concentration, gr/dscf	0.015	0.013	0.019	0.016
Emission Rate, lb/hr	14	13	18	15
Emission Factor, lb/MMBtu	0.031	0.027	0.038	0.032

SECTION 3
SOURCE TESTING METHODOLOGY

The emission testing program was conducted in accordance with the U.S. EPA Reference Methods summarized in Table 3-1. Method descriptions and quality assurance data are provided in the referenced appendices.

TABLE 3-1
SOURCE TESTING METHODOLOGY

Parameter	Method Number	Appendix Reference		Comments
		Method Description	Quality Control Data	
Volumetric Flow Rate	1,2,3,4	B.1	E	
Particulate Matter	5	B.2	E	

APPENDIX A
SAMPLE CALCULATIONS

SAMPLE CALCULATIONS

BFB Boiler
Run 1

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6\ in.\ H_2O/in.\ Hg}$$

where, PB = barometric pressure, in. Hg
ΔH = Pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6\ in.\ H_2O/in.\ Hg}$$

where, PB = barometric pressure, in. Hg
Pg = Static Pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.64\ °R/in.\ Hg\ x\ Y\ x\ Vm\ x\ Pm}{Tm}$$

where, Y = meter correction factor
Vm = meter volume, dscf
Pm = meter pressure, in. Hg
Tm = meter temperature, °R

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707\ ft^3/mL\ x\ Vlc$$

where, Vlc = volume of H_2O collected, mL

Moisture Fraction (Measured), (Bws)

$$Bws = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where, Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Moisture Fraction (at saturation), (Bws)

$$Bws = \frac{Vp}{Ps}$$

where, Vp = vapor pressure of H_2O at stack gas temp., in. Hg
Ps = absolute stack gas pressure, in. Hg

Moisture %, (%)

$$Bws = Bws \times 100$$

where, Bws = moisture fraction, measured or at saturation, whichever is lowest

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28(100 - \%CO_2 - \%O_2))$$

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md\ (1 - Bws) + 18(Bws)$$

where, Md = molecular weight (DRY), lb/lb-mole
Bws = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \frac{ft}{sec} \sqrt{\frac{(lb/lb - mole)(in.\ Hg)}{(^\circ R)(in.\ H_2O)}} \times Cp \times \sqrt{Delta\ P}\ avg. \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where, Cp = pitot tube coefficient
Delta P = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, °R
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60\ sec/min \times Vs \times As$$

where, Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.64 \frac{°R}{in.\,Hg} \times Qa \times (1 - Bws) \times \frac{Ps}{Ts}$$

where, Qa = average stack gas flow at stack conditions, ft^3/min
Bws = moisture content (dimensionless)
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, °R

Percent Isokinetic Sampling Rate (%I)

$$\%I = \frac{0.0945(in.\,Hg)(min)/(°R)(sec) \times Ts \times Vmstd}{Ps \times Vs \times An \times \Theta \times (1 - Bws)}$$

where, Ts = avg. stack temperature, °R
Vmstd = standard meter volume, dscf
Ps = absolute stack gas pressure, in. Hg
Vs = stack gas velocity, ft/sec
An = cross-sectional area of nozzle, ft^2
Θ = total sampling time, min
Bws = moisture content (dimensionless)

Particulate Matter Concentration at Standard Conditions (Cs), gr/dscf

$$Cs = 15.43 \frac{gr}{g} \times \frac{Mn}{Vmstd}$$

where, Mn = particulate matter collected, g
Vmstd = std. meter volume, dscf

Particulate Matter Emission Rate (PMR), lb/hr

$$PMR = \frac{Cs \times Qs \times 60 \frac{min}{hr}}{7000 \frac{gr}{lb}}$$

where, Cs = particulate conc. at std. cond., gr/dscf
Qs = avg. stack gas flow at std. cond., dscf/min

PM Emission Factor (EMF), lb/MMBtu (correcting for O_2)

$$EMF = PM\ conc. \frac{gr}{dscf} \times \frac{lb}{7000\ gr} \times F\ factor, \frac{dscf}{MMBtu} \times \frac{20.9}{20.9 - \%O_2}$$

where, PM conc. = Cs
F factor = defined by client or CFR, scf/MMBtu

APPENDIX B
TEST METHODOLOGY

B.1 VOLUMETRIC FLOW RATE

B.2 PARTICULATE MATTER

B.1 VOLUMETRIC FLOW RATE

Mass emission rates are calculated by multiplying measured target analyte concentrations by calculated volumetric flow rates. Volumetric flow rates are calculated using measurement data obtained by EPA Reference Methods 1-4.

The ductwork is measured at the sample location to the nearest 0.25 inch using a steel tape measure. Traverse points are selected in accordance with EPA Reference Method 1 on the basis of ductwork dimensions, geometry, and upstream and downstream disturbances. When a sample location does not meet EPA Reference Method 1 criteria, the maximum recommended number of traverse points is used.

Gas Velocity

The velocity of the gas stream is measured in accordance with EPA Reference Method 2 by reading the instantaneous velocity pressure with an inclined manometer at each traverse point using either a standard "P" type or an "S" type pitot tube. The stack pressure is calculated from the measured static pressure of the stack and the ambient barometric pressure. The static pressure is measured by using the static side of the pitot tube, and the barometric pressure is measured using a calibrated aneroid barometer. Magnahelic® gauges with scales of 0 to 5 and 0 to 25 inches of water or an inclined manometer with a scale of 0 to 10 inches of water is used for velocity pressure measurements. Manometer selection is determined by the velocity pressure of the gas stream. A manometer with a 0 to 0.25 inch scale may be used when the velocity pressure of the gas stream is less than 0.02 inches of water. By convention, any measured velocity pressures of less than 0.005 inches of water are recorded and reported as less than 0.005 inches of water. The stack temperature is measured with a calibrated thermocouple and pyrometer.

For low velocity pressure measurements (less than 0.005 inches of water) a hot wire anemometer may be used to measure the velocity of the gas stream. The indicated velocity is used without correction when the gas stream is ambient air with a moisture content of less than 65%. The indicated velocity is corrected in accordance with procedures specified by the manufacturer when the moisture content exceeds 65% or when the dry gas fraction is something other than ambient air.

Gas Composition and Moisture Content

The composition of the gas stream is measured in accordance with EPA Reference Method 3 using an Orsat or Fyrite Combustion Gas Analyzer. Gas composition determinations are conducted using either integrated or grab sampling techniques.

Grab samples are analyzed using a Fyrite analyzer by withdrawing a gas sample from the source and introducing the sample directly to a zeroed oxygen or carbon dioxide combustion gas analyzer.

After introduction of the gas sample, the analyzer is inverted the prescribed number of times and the analyzer fluid level is recorded giving a percent by volume determination of the oxygen or carbon dioxide concentrations.

Integrated samples are collected by withdrawing a sample from the source through a moisture condenser into a Tedlar® sample bag. The bag is then analyzed using an Orsat analyzer.

The moisture content of the gas stream is determined using one of the following procedures:

- For sources requiring testing by EPA Reference or Test Methods 5, 8, 12, 13, 17, 23, 26A, 29, 0010, or 0011, moisture is determined by EPA Reference Method 4. At the conclusion of each run the volume of condensed moisture in the impingers of the sampling train is measured and used to calculate the moisture content of the gas stream.
- For sources with temperatures greater than 212 °F, the approximation technique described in EPA Reference Method 4 may be used with midget impingers to condense moisture before dry gas volume measurement.
- For sources with a temperature of less than 212 °F, wet bulb/dry bulb temperature measurements may be made, and the moisture content calculated using vapor pressure tables.

When multiple methods are used for moisture determinations, the lowest moisture value is used for volumetric flow calculations.

The molecular weight of the gas stream is calculated using the measured moisture, oxygen, and carbon dioxide concentrations. The balance of the gas stream is assumed to be nitrogen. The volumetric flow is then calculated at stack and standard conditions using the calculated molecular weight, the measured stack temperature, and measured velocity, stack and barometric pressures. Standard conditions are 68 °F and 29.92 inches of mercury and 0% moisture.

Data Acquisition and Reporting

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed (where possible) with preprogrammed calculators or spreadsheet software.

Quality Control

Quality control procedures for volumetric flow measurements involve leak checks of pitot tubes, pitot tube lines and manometers; periodic analysis of ambient air and duplicate analysis of source gas samples with the Fyrite analyzer; triplicate analysis with the Orsat analyzer; and periodic calibration checks of thermocouples and pyrometers.

Data transfers are minimized. Data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

B.2 PARTICULATE MATTER

Particulate matter (PM) emission testing is conducted using EPA Reference Method 5. EPA Reference Methods 1-4 are used, as appropriate, for traverse point selection, determination of stack gas molecular weight, stack gas moisture determination, and volumetric flow rate.

Sampling Equipment and Procedures

The sampling train utilized to perform the PM sampling is an EPA Reference Method 5 train manufactured by Graseby-Nutech, Graseby-Anderson, or Apex Instruments (see Figure B-1). A measured borosilicate, quartz glass, or stainless steel (316) nozzle is attached to a heated (248 ± 25 °F) borosilicate or quartz glass, or stainless steel probe of appropriate length. The probe is connected to a heated (248 ± 25 °F) borosilicate glass filter holder containing a 9-cm glass fiber filter (preweighed to a constant 0.1 mg weight). The first and second impingers each contain 100 mL of distilled water, the third impinger is empty, and the fourth impinger contains 200 to 300 grams of dry preweighed silica gel. The second impinger is a standard Greenburg-Smith type. The first, third, and fourth impingers are of a modified design. All impingers are maintained in a crushed ice bath. A gas measuring control console with a leak-free vacuum pump, a calibrated dry gas meter, a calibrated orifice, and inclined manometers are connected to the final impinger, probe, heated filter holder, and pitot tube via an umbilical cord to complete the train.

Flue gas velocity is measured with a calibrated S-type pitot tube (provided with extensions) fastened alongside the sampling nozzle. Flue gas temperature is monitored with a calibrated direct readout pyrometer equipped with a chromel-alumel (Type K) thermocouple positioned near the sampling nozzle. The probe, filter box, and impinger exit gas temperatures are monitored with a calibrated direct readout pyrometer equipped with Type K thermocouples positioned in the probe, heated filter chamber, and in the sample gas stream after the last impinger. Stack gas stream composition (carbon dioxide and oxygen content) is determined as previously described. The sampling rate is adjusted, based on stack velocity, at each point to ensure the sample is collected isokinetically.

At the conclusion of each test, the sampling train is leak checked. Upon completion of a successful leak check, the sampling train is dismantled, openings are sealed, and the components recovered as described below.

- The glass fiber filter(s) is/are removed from its holder with tweezers and placed in its original container, along with any particulate and filter fragments (Sample Fraction 1).

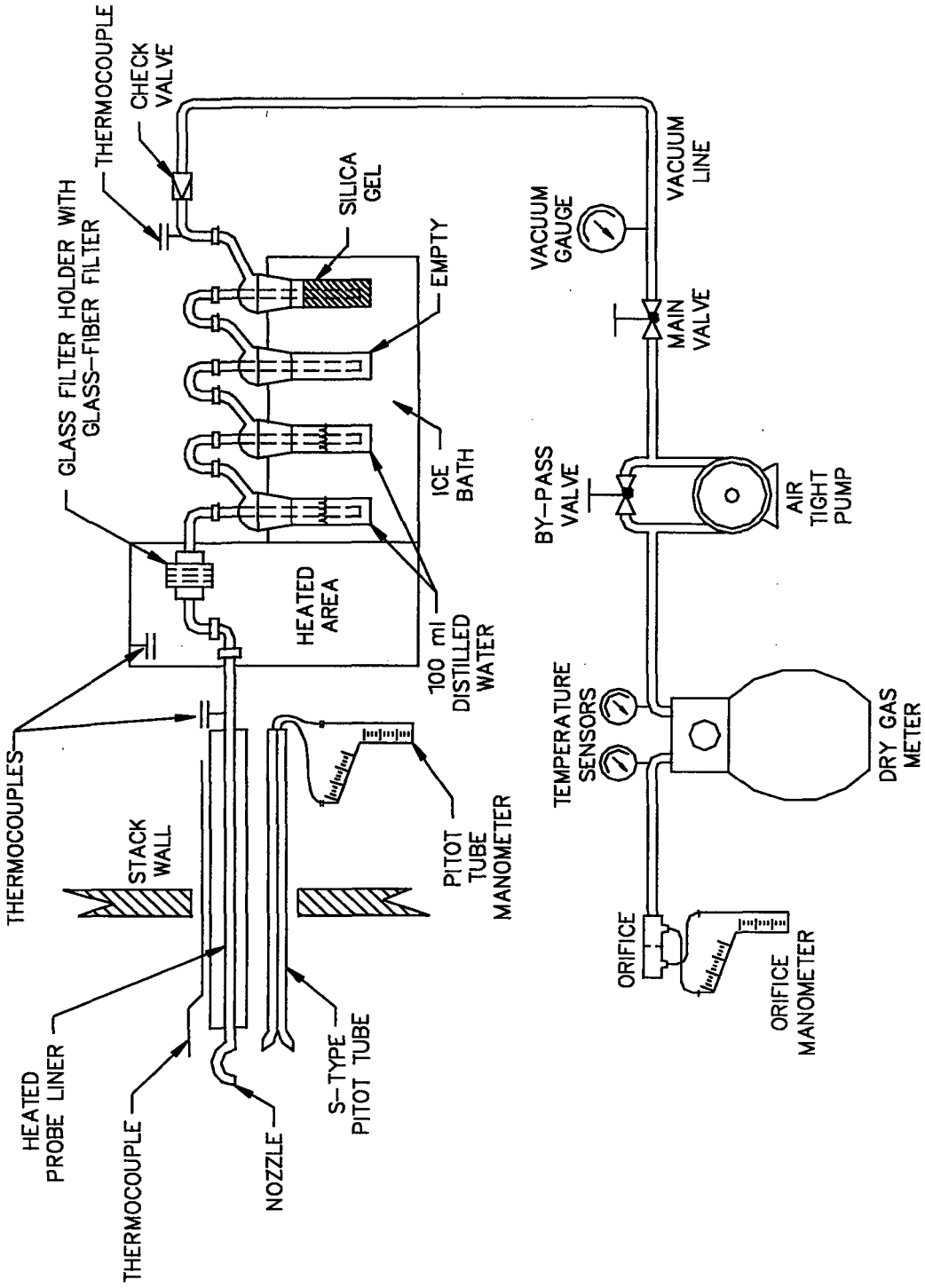

Figure B-1 EPA Reference Method 5 Sampling Train

- The probe and nozzle are separated and the particulate rinsed with distilled water or acetone into a polyethylene container while brushing a minimum of three times. Particulate adhering to the brush is rinsed with the appropriate solvent into the same container. The front half of the filter holder and connecting glassware are also rinsed. These rinses are combined (Sample Fraction 2).

- The total liquid content of impingers one, two, and three are measured volumetrically for stack gas moisture content calculation. This liquid is discarded.

- The silica gel is removed from the last impinger and immediately weighed to the nearest 0.1 g for stack gas moisture content calculation.

- Aliquots of the appropriate solvents and a filter are retained for blank analyses.

Each sample bottle is labeled to clearly identify its contents. The liquid level is marked on each bottle. The samples are then secured for transport to a laboratory for analysis. Sample integrity is assured by maintaining chain-of-custody records.

Sample Analysis

The particulate analysis proceeds as follows:

- The sample filters (Sample Fraction 1) and blank filter are desiccated for 24 hours and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weight.

- The nozzle, probe, and front half of the filter holder wash samples (Sample Fraction 2), along with the solvent blank, are evaporated in tared beakers, then desiccated and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weights.

The total weight of material measured in the front half wash in addition to the weight of material collected on the glass fiber filter represent the total PM catch for each train. Blank corrections are made where appropriate for all sample weights.

Data Acquisition and Reduction

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed with preprogrammed calculators or spreadsheet software. Data transfers are minimized. Field and laboratory data sheets are be checked for completeness and accuracy. Calculations are verified by a second person.

Quality Control

Dry gas meters are calibrated before and after sampling. Thermocouples are calibrated against mercury thermometers, and aneroid barometers are calibrated against a mercury barometer. WESTON participated satisfactorily in the most recent dry gas meter audit supplied by the EPA. Those data are on file at WESTON.

Prior to and following each run, the sampling train is leak checked. An acceptable leak rate does not exceed the lesser of 0.02 actual cubic feet per minute (acfm) or 4% of the actual sampling rate. The isokinetic sampling rate is calculated at the completion of each sample run. If the isokinetic sampling rate is not within 100% ± 10%, the sample run is repeated.

Samples are transported to the laboratory under chain-of-custody. Solvent blanks and filter blanks are analyzed at the same time as the samples. The mass collected on the filters and the mass in the probe wash are corrected by the blank measurements.

WESTON uses Class S weights during each stage of the analysis to verify the accuracy of the balance. The balance is repaired and recalibrated before proceeding if there is a significant difference in the actual mass and measured mass.

APPENDIX C
FIELD DATA – BFB BOILER
CONDITION ONE
BARK WITH 45 ODTD SLUDGE

Rayonier
Fernandina Beach

05565.008.010
BFB Boiler

Bark w/ 45 ODTD Sludge

ISOKINETIC CALCULATIONS

Run Number		1	2	3	Mean
Date		4/15/09	4/15/09	4/15/09	---
Time Began		1157	1347	1535	---
Time Ended		1303	1455	1642	---
	INPUT DATA				
Sampling Time, min	(Theta)	60.0	60	60	60
Stack Diameter, in.	(Dia.)	120.00	120.00	120.00	120.00
Barometric Pressure, in. Hg	(Pb)	29.94	29.94	29.94	29.94
Static Pressure, in. H2O	(Pg)	-0.83	-0.81	-0.72	-0.79
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Meter Correction Factor	(Y)	1.0110	1.0110	1.0110	1.0110
Orifice Calibration Value	(Delta H@)	1.6700	1.6700	1.6700	1.6700
Nozzle Diameter, in.	(Dn)	0.270	0.270	0.270	0.270
Meter Volume, ft^3	(Vm)	36.625	36.892	34.790	36.102
Meter Temperature, °F	(Tm)	93.6	97.1	96.4	95.7
Meter Temperature, °R	(Tm-R)	553.6	557.1	556.4	555.7
Meter Orifice Pressure, in. H2O	(Delta H)	1.159	1.176	1.053	1.129
Ave Sq Rt Orifice Press, (in. H2O)^½	((Delta H)½)avg)	1.067	1.072	1.017	1.052
Volume H2O Collected, mL	(Vlc)	211.9	198.1	180.9	197.0
CO2 Concentration, %	(CO2)	13.2	13.2	13.1	13.2
O2 Concentration, %	(O2)	6.9	7.0	6.9	6.9
Ave Sq Rt Velo Head, (in. H2O)^½	((Delta P)½)avg)	0.695	0.699	0.663	0.686
Stack Temperature, °F	(Ts)	367.2	370.7	371.3	369.7
Stack Temperature, °R	(Ts-R)	827.2	830.7	831.3	829.7
Particulate Collected, g	(Mn)	0.0376	0.0394	0.0434	0.0401
Moisture Fraction (at Saturation)	(BWS)	NA	NA	NA	0.000
O2 F-Factor, dscf/MMBtu	(Fd)	9605	9608	9610	9608
	CALCULATED DATA				
Nozzle Area, ft^2	(An)	3.98E-04	3.98E-04	3.98E-04	3.98E-04
Stack Area, ft^2	(As)	78.54	78.54	78.54	78.54
Stack Pressure, in. Hg	(Ps)	29.88	29.88	29.89	29.88
Meter Pressure, in. Hg	(Pm)	30.03	30.03	30.02	30.02
Standard Meter Volume, ft^3	(Vmstd)	35.426	35.461	33.473	34.786
Standard Water Volume, ft^3	(Vwstd)	9.974	9.325	8.515	9.271
Moisture Fraction (Measured)	(BWS)	0.220	0.208	0.203	0.210
Moisture Fraction (lower sat/meas)	(BWS)	0.220	0.208	0.203	0.210
Mol. Wt. of Dry Gas, lb/lb-mole	(Md)	30.39	30.39	30.37	30.38
Mol. Wt. of Stack Gas, lb/lb-mole	(Ms)	27.67	27.81	27.86	27.78
Average Stack Gas Velocity, ft/sec	(Vs)	49.95	50.21	47.58	49.25
Stack Gas Flow, actual, ft^3/min	(Qa)	235405	236599	224235	232080
Stack Gas Flow, Std , ft^3/min	(Qs)	117040	118869	113370	116426
Isokinetic Sampling Rate, %	(%I)	99.7	98.2	97.2	98.4
Particulate Conc @ Std Cond, gr/ft^3	(Cs)	0.0164	0.0171	0.0200	0.0178
Particulate Emission, lb/hr	(PMR)	16.4	17.5	19.4	17.8
Particulate Emission Factor, lb/MMBtu	(Fd)	0.0335	0.0354	0.0410	0.0366
Calibration check	(Yqa)	1.0131	1.0142	1.0193	1.016
Percent difference from Y					0.45%

CLIENT	: Rayonier	Balance ID:	Mettler AE163
WESTON W.O. No.	: 05565.008.010	Density of Acetone (g/mL):	0.7848
Date Analyzed	: 4/15/09	Lab Ambient Temp (F):	68.7
Analyst	: SBrown	Lab Rel Humidity (%):	48
		Barometric Pressure (Hg):	29.94

Source	**BFB Boiler**			
Operating Mode/Condition	**Bark w/ 45 ODTD Sludge**			
Field Run No.	**ONE**	**TWO**	**THREE**	**FIELD BLANK**
LIQUID FRACTION				
Probe Wash ID				
Beaker ID	42-03	43-03	44-03	40-03
Liquid Volume (mL)	75	74	76	200
Initial Beaker Weights (g)				
Weight #1	109.4891	99.2506	100.3428	100.9652
Weight #2	109.4888	99.2504	100.3429	100.9653
Average Initial Weight (g)	**109.4890**	**99.2505**	**100.3429**	**100.9653**
Final Beaker Weights (g)				
Weight #1	109.5086	99.2650	100.3656	100.9660
Weight #2	109.5081	99.2652	100.3651	100.9658
Average Final Weight (g)	**109.5084**	**99.2651**	**100.3654**	**100.9659**
Final-Initial Beaker Wts. (g)	0.0194	0.0146	0.0225	0.0006
Sample/Blank Volume Ratio	0.3750	0.3700	0.3800	
Liquid Blank Correction (g)	0.0002	0.0002	0.0002	
Liquid Particulate Weight (g)	**0.0192**	**0.0144**	**0.0223**	**0.0006**
FILTER FRACTION				
Filter ID	**DA 0631**	**DA 0632**	**DA 0633**	**DA 0635**
Initial Filter Weights (g)				
Weight #1	37.8385	37.4267	37.2939	36.4322
Weight #2	37.8389	37.4264	37.2936	36.4320
Average Initial Weight (g)	**37.8387**	**37.4266**	**37.2938**	**36.4321**
Final Filter Weights (g)				
Weight #1	37.8571	37.4514	37.3149	36.4318
Weight #2	37.8571	37.4517	37.3149	36.4321
Average Final Weight (g)	**37.8571**	**37.4516**	**37.3149**	**36.4320**
Final-Initial Filter Wts. (g)	0.0184	0.0250	0.0211	-0.0001
Filter Blank (g)	-0.0001	-0.0001	-0.0001	
Filter Particulate Weight (g)	**0.0184**	**0.0250**	**0.0211**	
SUMMARY				
Filter Particulate Weight (g)	**0.0184**	**0.0250**	**0.0211**	
Liquid Particulate Weight (g)	**0.0192**	**0.0144**	**0.0223**	
Net Particulate Weight (g)	**0.0376**	**0.0394**	**0.0434**	

Sample Recovery Solution Acetone

Weight Percent of Blank Liquid Fraction 0.0004%

Note: If the blank liquid fraction has a residue weight percent of greater than 0.001 percent, then the samples are not blank corrected.

DA0631

ISOKINETIC FIELD DATA SHEET — EPA Method 5

Page 1 of 1

		Stack Conditions	Assumed	Actual						
Client	Rayonier				Meter Box ID	A013		K Factor	2.35	
W.O.#	05565.008.010				Meter Box Y	1.011				
Project ID	Ray	% Moisture	22		Meter Box Del H	1.670	Leak Checks	Initial	Mid-Point	Final
Mode/Source ID	N/A	Impinger Vol (ml)		203	Probe ID / Length	R2SU 5'	Sample Train (ft^3)	.005		.005
Samp. Loc. ID	BFB	Silica gel (g)		8.9	Probe Material	SS	Leak Check @ (in Hg)	15		7
Run No.ID	1	CO2, % by Vol	7.5	13.2	Pitot / Thermocouple ID	P18	Pitot good	(yes) / no	yes / no	(yes) / no
Test Method ID	M5	O2, % by Vol	13.2	6.9	Pitot Coefficient	0.84	Orsat good	(yes) / no	yes / no	(yes) / no
Date ID	4/15/09	Temperature (°F)			Nozzle ID	.27	Temp Check	Pre-Test Set		Post-Test Set
Source/Location	BFB	Meter Temp (°F)			Avg Nozzle Dia (in)	.270	Meter Box Temp			
Sample Date	4/15/09	Static Press (in H_2O)	-.83	-.83	Area of Stack (ft^2)	78.54	Reference Temp			
Baro. Press (in Hg)	29.94				Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	BR	Ambient Temp (°F)		72	Total Traverse Pts	24	Temp Change Response	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (military)	VELOCITY PRESSURE (Δp) (in H_2O)	ORIFICE PRESSURE (DH) (in H_2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	OVEN	IMPINGER EXIT TEMP	SAMPLE VAC (in Hg)	GAS SAMPLED (ft^3)	COMMENTS
	0	1157			54.575									
A1	2.5	3P 4-15-09	.52 .66	1.56	61.6	370	90		240	240	66	5	240	
2	5		.33	1.82	63.4	379	92		240	240	64	5	252	
3	7.5		.45	1.53	65.1	380	93		240	240	62	5	253	
4	10		.49	1.15	66.7	378	93		238	240	60	5	254	
5	12.5		.53	1.25	68.2	379	93		240	240	60	5	254	
6	15		.42	.44	69.6	371	93		240	240	61	5	251	
B1	17.5		.60	1.41	71.3	370	90		240	240	60	5	250	
2	20		.59	1.39	72.9	373	93		240	240	63	5	247	
3	22.5		.52	1.22	74.5	373	94		240	240	62	5	252	
4	25		.49	1.15	76.1	371	95		241	240	63	5	256	
5	27.5		.41	.96	77.5	362	95		242	240	63	5	250	
6	30		.33	.78	78.833	340	95		240	241	64	5	251	
C1	32.5		.63	1.43	80.5	368	90		241	242	68	6	249	
2	35		.57	1.34	82.2	368	94		240	240	59	5	250	
3	37.5		.40	.94	83.6	368	95		240	241	57	5	251	
4	40		.38	.89	85.0	360	94		240	240	59	4	251	
5	42.5		.36	.85	86.4	351	95		240	241	61	4	246	
6	45		.31	.73	87.639	350	95		241	240	61	4	245	
D1	47.5		.66	1.55	89.4	370	92		240	240	63	5	249	
2	50		.57	1.34	91.0	372	95		240	241	60	5	249	
3	52.5		.46	1.08	92.5	373	95		240	240	60	5	250	
4	55		.36	.85	93.9	369	96		241	241	60	5	250	
5	57.5		.33	.78	95.1	368	95		241	242	61	5	250	
6	60	1203	.30	.71	96.200	350	95		241	242	61	4	251	
		1303 EST	Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.6954	1.1588	36.625	367.2	93.6		238/242	240/242	68	6	256	
			Avg: .4925	Avg Sqrt Del H 1.0867	Comments:									

ISO = 100
moist = 22.

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D40632

ISOKINETIC FIELD DATA SHEET — EPA Method 5

Page 1 of 1

		Stack Conditions	Assumed	Actual						
Client	Rayonier				Meter Box ID	A-13			K Factor	2.35
W.O.#	05565.008.010				Meter Box Y	1.011				
Project ID	Ray	% Moisture			Meter Box Del H	1.670		Leak Checks	Initial	Mid-Point / Final
Mode/Source ID	M2	Impinger Vol (ml)		188	Probe ID / Length	PR5C	5'	Sample Train (ft^3)	0.05	/ 0.59
Samp. Loc. ID	BFB	Silica gel (g)		10.1	Probe Material	SS		Leak Check @ (in Hg)	15	/ 3
Run No.ID	2	CO2, % by Vol		13.2	Pitot / Thermocouple ID	P18		Pitot good	yes / no	yes / no / yes / no
Test Method ID	M5	O2, % by Vol		7.0	Pitot Coefficient	0.84		Orsat good	yes / no	yes / no / yes / no
Date ID	4/15/09	Temperature (°F)			Nozzle ID	27		Temp Check	Pre-Test Set	Post-Test Set
Source/Location	BFB	Meter Temp (°F)			Avg Nozzle Dia (in)	.270		Meter Box Temp		
Sample Date	4/15/09	Static Press (in H_2O)		-.91	Area of Stack (ft^2)	78.54		Reference Temp		
Baro. Press (in Hg)	29.94				Sample Time	60		Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	JN	Ambient Temp (°F)		74	Total Traverse Pts	24		Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (military)	VELOCITY PRESSURE (in H_2O)	ORIFICE PRESSURE (in H_2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)		IMPING. EXIT (°F)	SAMPLE TRAIN VAC (in Hg)	CO2 Start	COMMENTS
	0	1347			97.888									
A1	2.5		.63	1.48	97.5	370	91		240	240	66	5	240	
2	5		.60	1.41	101.3	376	95		240	241	62	5	241	
3	7.5		.51	1.20	102.8	375	97		240	240	61	5	241	
4	10		.40	.94	104.3	372	98		240	241	59	5	247	
5	12.5		.32	.71	105.5	371	98		240	240	59	4	248	
6	15		.27	.63	106.676	362	97		240	240	59	4	249	
B1	17.5		.55	1.29	108.4	369	93		240	240	64	4	251	
2	20		.57	1.34	110.1	375	98		241	242	60	5	247	
3	22.5		.46	1.08	111.7	373	99		246	246	60	5	255	
4	25		.35	.82	112.4	367	99		244	242	60	5	256	
5	27.5		.33	.78	114.2	360	98		245	241	63	5	255	
6	30		.27	.63	115.362	350	99		240	240	63	4	252	
C1	32.5	32 4/15/09	.71	1.67	117.2	374	95		240	241	66	6	255	
2	35		.62	1.60	118.9	375	99		241	240	61	6	251	
3	37.5		.59	1.39	120.6	376	99		240	241	60	6	204	
4	40		.65	1.53	122.4	378	99		240	242	60	6	260	
5	42.5		.50	1.18	123.9	361	100		240	241	61	6	259	
6	45		.40	.94	125.416	350	98		241	240	62	5	258	
D1	47.5		.74	1.75	127.1	377	94		240	241	67	5	253	
2	50		.63	1.48	128.8	379	97		240	242	66	5	255	
3	52.5		.65	1.53	130.6	380	97		241	242	64	6	254	
4	55		.50	1.18	132.1	379	97		240	242	61	5	260	
5	57.5		.37	.87	133.5	377	97		241	241	61	5	260	
6	60	1455	.34	.80	134.780	370	97		240	241	64	5	260	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.5000	1.1758	36.892	370.7	97.1		240/245	240/246	67	6	264	
			.4993	Avg Sqrt Del H 1.0723	Comments:									

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D20633

ISOKINETIC FIELD DATA SHEET — EPA Method 5

Page 1 of 1

		Stack Conditions	Assumed	Actual						
Client	Rayonier				Meter Box ID	M013			K Factor	2.35
W.O.#	05565.008.010				Meter Box Y	1.511				
Project ID	Ray	% Moisture			Meter Box Del H	1.670		Leak Checks	Initial	Mid-Point / Final
Mode/Source ID	—	Impinger Vol (ml)		172	Probe ID / Length	P252	5'	Sample Train (ft^3)	5.05	/ .045
Samp. Loc. ID	BFB	Silica gel (g)		8.5	Probe Material	SS		Leak Check @ (in Hg)	15	/ 7
Run No.ID	3	CO2, % by Vol		13.1	Pitot / Thermocouple ID	9,3		Pitot good	(yes) / no	yes / no / (yes) / no
Test Method ID	M5	O2, % by Vol		6.5	Pitot Coefficient	0.84		Orsat good	(yes) / no	yes / no / (yes) / no
Date ID	4/15/09	Temperature (°F)			Nozzle ID	.227		Temp Check	Pre-Test Set	Post-Test Set
Source/Location	BFB	Meter Temp (°F)			Avg Nozzle Dia (in)	.270		Meter Box Temp		
Sample Date	4/15/09	Static Press (in H_2O)		-.72	Area of Stack (ft^2)	78.54		Reference Temp		
Baro. Press (in Hg)	29.74				Sample Time	60		Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	[illegible]	Ambient Temp (°F)		72	Total Traverse Pts	24		Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO	SAMPLE TIME (min)	CLOCK TIME (24 HR)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	[illegible]	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	[illegible]	COMMENTS
	0	1535			135.265									
A1	2.5		.68	1.90	137.1	374	89		240	240	67	5	240	
2	5		.55	1.29	138.7	376	94		240	240	65	5	240	
3	7.5		.46	.94	140.1	376	95		240	240	64	5	244	
4	10		.57	1.34	141.7	376	95		240	241	60	5	252	
5	12.5		.53	1.24	143.2	376	95		240	241	60	5	250	
6	15		.39	.92	144.6	370	96		241	242	58	5	251	
B1	17.5		~~.55~~ .55	~~1.28~~ 1.29	146.2	370	90		242	244	67	5	250	
2	20		.56	1.32	147.7	375	95		242	240	58	5	251	
3	22.5		.58	1.36	149.3	375	96		241	240	56	5	258	
4	25		.44	1.03	150.8	373	97		240	242	56	5	257	
5	27.5		.37	.87	152.1	372	97		240	241	57	5	261	
6	30		.30	.71	153.401	365	97		242	240	57	5	255	
C1	32.5		.50	1.18	154.9	372	92		244	242	68	5	250	
2	35		.46	1.08	156.4	373	99		240	241	65	6	265	
3	37.5		.45	1.06	157.9	372	97		240	242	60	6	255	
4	40		.35	.82	159.2	364	98		240	241	64	5	259	
5	42.5		.34	.80	160.5	368	98		240	242	64	5	259	
6	45		.27	.63	161.715	360	98		241	244	64	5	255	
D1	47.5		.63	1.48	163.3	372	94		240	241	64	5	250	
2	50		.57	1.34	165.0	376	100		240	240	68	5	251	
3	52.5		.44	1.03	166.5	374	101		241	241	66	5	255	
4	55		.31	.73	167.7	372	101		242	244	66	5	256	
5	57.5		.27	.63	168.9	370	101		241	244	65	5	255	
6	60	1642	.25	.59	~~169~~ 170.055	361	100		241	242	65	5	260	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.6632	1.0533	34.790	371.3	96.4		240/~~242~~	240/244	68	6	261	
				Avg Sqrt Del H	Comments:									
				1.0165										

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Avg = .4483

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(83)

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SAMPLE RECOVERY FIELD DATA

EPA Method 5

Client: Rayonier | W.O. #: 05565.008.010
Location/Plant: Fernandina Beach, FL | Source & Location: BFB

Run No. 1 | Sample Date 4-15-09 | Recovery Date 4-15-09
Sample I.D. BFB | Analyst BR/SB | Filter Number D2c6631

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H20	H20	Empty						Silica Gel	
Final	296	104	3						327.9	
Initial	100	100	0						319.0	
Gain	196	4	3					203	8.9	211.9

Impinger Color: Clear | Labeled? Y
Silica Gel Condition: Good | Sealed? Y

Run No. 2 | Sample Date 4-15-09 | Recovery Date 4-15-09
Sample I.D. BFB | Analyst BR/SB | Filter Number D2c6632

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H20	H20	Empty						Silica Gel	
Final	282	103	3						330.3	
Initial	100	100	0						320.2	
Gain	182	3	3					188	10.1	198.1

Impinger Color: Clear | Labeled? Y
Silica Gel Condition: Good | Sealed? Y

Run No. 3 | Sample Date 4-15-09 | Recovery Date 4-15-09
Sample I.D. BFB | Analyst BR/SB | Filter Number D2c6633

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H20	H20	Empty						Silica Gel	
Final	264	104	4						336.2	
Initial	100	100	0						327.3	
Gain	164	4	4					172	8.9	180.9

Impinger Color: Clear | Labeled? Y
Silica Gel Condition: Good | Sealed? Y

Check COC for Sample IDs of Media Blanks

WESTON MANAGERS DESIGNERS/CONSULTANTS

Sample and Velocity Traverse Point Data Sheet - Method 1

Client: **Rayonier** | Operator: **TS**

Loaction/Plant: **Fernandina Beach, FL** | Date: **2-Oct-07**

Source: **BFB Boiler** | W.O. Number: **05565.008.007.01.05**

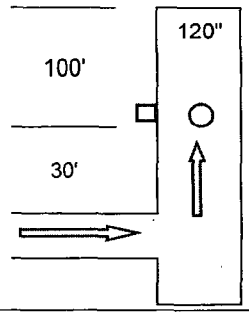
Duct Type	☑ Circular	☐ Rectangular Duct	Indicate appropriate type
Traverse Type	☑ Particulate Traverse	☐ Velocity Traverse	

Distance from far wall to outside of port (in.) = C	**126.00**
Port Depth (in.) = D	**6.00**
Depth of Duct, diameter (in.) = C-D	120
Area of Duct (ft^2)	78.54
Total Traverse Points	24
Total Traverse Points per Port	12

Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	

Flow Disturbances	
Upstream - A (ft)	**100.0**
Downstream - B (ft)	**30.0**
Upstream - A (duct diameters)	10.0
Downstream - B (duct diameters)	3.0

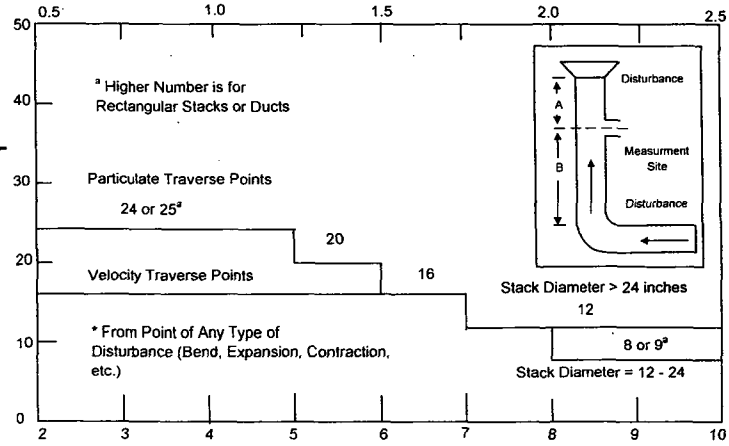
Diagram of Stack



Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	2.1	2 1/2	8 1/2
2	6.7	8	14
3	11.8	14	20
4	17.7	21	27
5	25.0	30	36
6	35.6	42 1/2	48 1/2
7	64.4	77 1/2	83 1/2
8	75.0	90	96
9	82.3	99	105
10	88.2	106	112
11	93.3	112	118
12	97.9	117 1/2	123 1/2

Duct Diameters Upstream from Flow Disturbance* (Distance A)



Duct Diameters Downstream from Flow Disturbance* (Distance B)

Equivalent Diameter = (2*L*W)/(L+W)

Traverse Point Location Percent of Stack -Circular

Traverse Point	Number of Traverse Points											
	1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

Traverse Point	Number of Traverse Points											
	1	2	3	4	5	6	7	8	9	10	11	12
1		25.0	16.7	12.5	10.0	8.3	7:1	6.3	5.6	5.0	4.5	4.2
2		75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3			83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4				87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5					90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6						91.7	78.6	68.8	61.1	55.0	50.0	45.8
7							92.9	81.3	72.2	65.0	59.1	54.2
8								93.8	83.3	75.0	68.2	62.5
9									94.4	85.0	77.3	70.8
10										95.0	86.4	79.2
11											95.5	87.5
12												95.8

Rectangular Stack Points & Matrix

9 - 3 x 3
12 - 4 x 3
16 - 4 x 4
20 - 5 x 4
25 - 5 x 5
30 - 6 x 5
36 - 6 x 6
42 - 7 x 6
49 - 7 x 7

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RUN DATA

Number 3

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 15:21				
Run 1 Compliance				
15:21:52	2364	6.9	4384	13.2
15:22:02	2363	6.9	4385	13.2
15:22:12	2367	6.9	4380	13.2
15:22:22	2363	6.9	4385	13.2
15:22:32	2367	6.9	4385	13.2
15:22:42	2366	6.9	4385	13.2
15:22:52	2370	6.9	4387	13.2
15:23:02	2366	6.9	4385	13.2
15:23:12	2366	6.9	4387	13.2
15:23:22	2367	6.9	4387	13.2
Run Avg	**2366**	**6.9**	**4385**	**13.2**

RUN DATA

Number 4

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
	Starting time 15:24			
	Run 2 Compliance			
15:24:45	2405	7.0	4341	13.1
15:24:55	2396	7.0	4385	13.2
15:25:05	2395	7.0	4397	13.2
15:25:15	2400	7.0	4400	13.3
15:25:25	2392	7.0	4400	13.3
15:25:35	2404	7.0	4399	13.2
15:25:45	2394	7.0	4396	13.2
Run Avg	**2398**	**7.0**	**4388**	**13.2**

RUN DATA

Number 5

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 17:09				
Run 3 Compliance				
17:09:44	2358	6.9	4360	13.1
17:09:54	2363	6.9	4362	13.1
17:10:04	2356	6.9	4362	13.1
17:10:14	2357	6.9	4359	13.1
17:10:24	2360	6.9	4362	13.1
17:10:34	2359	6.9	4361	13.1
17:10:44	2359	6.9	4361	13.1
17:10:54	2359	6.9	4357	13.1
17:11:04	2360	6.9	4363	13.1
17:11:14	2357	6.9	4361	13.1
17:11:24	2357	6.9	4362	13.1
Run Avg	**2359**	**6.9**	**4361**	**13.1**

CALIBRATION

Number 1

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**

Starting Time: 11:39

O2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	-4
12.0	CC 159811	4117
25.9	SG0067	8853

Curve Coefficients

Slope	Intercept	Corr. Coeff.
341.9	2.5	>0.9999

CO2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	-10
12.1	CC 159811	3969
24.4	SG0067	8152

Curve Coefficients

Slope	Intercept	Corr. Coeff.
334.5	-32.7	>0.9999

CALIBRATION ERROR

Number 1

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**

Starting Time: 11:39

O2

Method: EPA 3A

Slope 341.9 **Intercept** 2.5

Standard, %	Response, mV	%	Error, %
Zero	-4	0.0	0.0
12.0	4117	12.0	0.0
25.9	8853	25.9	0.0

CO2

Method: EPA 3A

Slope 334.5 **Intercept** -32.7

Standard, %	Response, mV	%	Error, %
Zero	-10	0.1	0.4
12.1	3969	12.0	-0.4
24.4	8152	24.5	0.4

ANALYZER INFORMATION

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**

File Name: C:\DATA\Rayonier Fernandina\BFB O2Bags.cem
Computer: WSAUB58 **Trailer:** 201

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	**O2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900 SN: 652836**
Full-Scale Output, mv	**10000**
Span Concentration, %	**25.9**

Channel 2

Analyte	**CO2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900 SN: 652836**
Full-Scale Output, mv	**10000**
Span Concentration, %	**24.4**

Determination of Stack Gas Velocity - Method 2

Client	Rayonier	Operator	BR/SB	Pitot Coeff (Cp)	0.84
Location/Plant	Fernandina Beach, FL	Date	4/15/09	Stack Area, ft² (As)	78.54
Source	BFB	W.O. Number	05565.008.010	Pitot Tube/Thermo ID	P18

Run Number	Prelim		
Time	909		
Barometric Press, in Hg (Pb)	~~29.74~~ 29.94		
Static Press, in H_2O (Pstatic)	-.73		
Source Moisture, % (BWS)			
O_2, %			
CO_2, %			

Cyclonic Flow Determination		Traverse Location		Leak Check good ? (Y) N		Leak Check good ? Y / N		Leak Check good ? Y / N	
Delta P at 0°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
.07	15	A	1	.61	362				
.05	10		2	.59	368				
.05	10		3	.53	370				
.05	10		4	.45	370				
.06	12		5	.36	358				
.04	8		6	.25	355				
.04	10	B	1	~~.66~~ .66	365	4/15/09			
.04	8		2	.56	367				
.04	7		3	.32	368				
.10	12		4	.25	367				
.12	15		5	.20	357				
.12	15		6	.16	354				
.12	12	C	1	.53	362				
.10	12		2	.45	363				
.10	10		3	.43	364				
.09	10		4	.45	364				
.09	9		5	.39	352				
.05	9		6	.33	349				
.05	14	D	1	.62	359				
.14	19		2	.58	364				
.14	15		3	.58	368				
.10	10		4	.56	370				
.10	11		5	.45	~~356~~				
.07	10		6	.26	359				
~~.01~~									
Avg Angle		Avg Delta P & Temp		.4404	362.5				
				.6536					
Average gas stream velocity, ft/sec.									
Vol. flow rate @ actual conditions, wacf/min									
Vol. flow rate at standard conditions, dscf/min									

$$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$$

$$MWs = (MWd * (1 - (BWS/100))) + (18 * (BWS/100))$$

$$Tsa = Ts + 460$$

$$Ps = Pb + (Pstatic/13.6)$$

$$Vs = 85.49 * Cp * avg\sqrt{DeltaP} * \sqrt{Tsa/(Ps * MWs)}$$

$$Qs(act) = 60 * Vs * As$$

$$Qs(std) = 17.64 * (1 - (BWS/100)) * (Ps/Tsa) * Qs(act)$$

where:
MWd = Dry molecular weight source gas, lb/lb-mole.
MWs = Wet molecular weight source gas, lb/lb-mole.
Tsa = Source Temperature, absolute(oR)
Ps = Absolute stack static pressure, inches Hg.
Vs = Average gas stream velocity, ft/sec.
Qs(act) = Volumetric flow rate of wet stack gas at actual, wacf/min
Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min

Comments method2

APPENDIX D
FIELD DATA – BFB BOILER
CONDITION TWO
BARK WITH 60 ODTD SLUDGE

Rayonier
Fernandina Beach

05565.008.010
BFB Boiler

Bark w/ 60 ODTD Sludge

ISOKINETIC CALCULATIONS

Run Number		1	2	3	Mean
Date		4/16/09	4/16/09	4/16/09	---
Time Began		922	1100	1239	---
Time Ended		1030	1207	1346	---
INPUT DATA					
Sampling Time, min	(Theta)	60.0	60	60	60
Stack Diameter, in.	(Dia.)	120.00	120.00	120.00	120.00
Barometric Pressure, in. Hg	(Pb)	30.06	30.06	30.06	30.06
Static Pressure, in. H2O	(Pg)	-0.75	-0.71	-0.71	-0.72
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Meter Correction Factor	(Y)	1.0110	1.0110	1.0110	1.0110
Orifice Calibration Value	(Delta H@)	1.6700	1.6700	1.6700	1.6700
Nozzle Diameter, in.	(Dn)	0.270	0.270	0.270	0.270
Meter Volume, ft^3	(Vm)	34.744	35.019	34.405	34.723
Meter Temperature, °F	(Tm)	73.2	71.8	70.1	71.7
Meter Temperature, °R	(Tm-R)	533.2	531.8	530.1	531.7
Meter Orifice Pressure, in. H2O	(Delta H)	1.092	1.097	1.057	1.082
Ave Sq Rt Orifice Press, (in. H2O)^½	((Delta H)½)avg)	1.036	1.040	1.021	1.032
Volume H2O Collected, mL	(Vlc)	215.7	196.3	207.6	206.5
CO2 Concentration, %	(CO2)	13.1	13.2	13.2	13.2
O2 Concentration, %	(O2)	7.1	6.9	6.9	7.0
Ave Sq Rt Velo Head, (in. H2O)^½	((Delta P)½)avg)	0.687	0.685	0.673	0.682
Stack Temperature, °F	(Ts)	373.7	369.0	363.2	368.6
Stack Temperature, °R	(Ts-R)	833.7	829.0	823.2	828.6
Particulate Collected, g	(Mn)	0.0334	0.0302	0.0425	0.0354
Moisture Fraction (at Saturation)	(BWS)	NA	NA	NA	0.000
O2 F-Factor, dscf/MMBtu	(Fd)	9604	9608	9604	9605
CALCULATED DATA					
Nozzle Area, ft^2	(An)	3.98E-04	3.98E-04	3.98E-04	3.98E-04
Stack Area, ft^2	(As)	78.54	78.54	78.54	78.54
Stack Pressure, in. Hg	(Ps)	30.00	30.01	30.01	30.01
Meter Pressure, in. Hg	(Pm)	30.14	30.14	30.14	30.14
Standard Meter Volume, ft^3	(Vmstd)	35.026	35.396	34.884	35.102
Standard Water Volume, ft^3	(Vwstd)	10.153	9.240	9.772	9.722
Moisture Fraction (Measured)	(BWS)	0.225	0.207	0.219	0.217
Moisture Fraction (lower sat/meas)	(BWS)	0.225	0.207	0.219	0.217
Mol. Wt. of Dry Gas, lb/lb-mole	(Md)	30.38	30.39	30.39	30.39
Mol. Wt. of Stack Gas, lb/lb-mole	(Ms)	27.60	27.82	27.68	27.70
Average Stack Gas Velocity, ft/sec	(Vs)	49.53	49.04	48.09	48.89
Stack Gas Flow, actual, ft^3/min	(Qa)	233409	231118	226637	230388
Stack Gas Flow, Std , ft^3/min	(Qs)	114882	117026	113843	115250
Isokinetic Sampling Rate, %	(%I)	100.4	99.6	100.9	100.3
Particulate Conc @ Std Cond, gr/ft^3	(Cs)	0.0147	0.0132	0.0188	0.0156
Particulate Emission, lb/hr	(PMR)	14.5	13.2	18.3	15.3
Particulate Emission Factor, lb/MMBtu	(Fd)	0.0306	0.0270	0.0385	0.0320
Calibration check	(Yqa)	1.0161	1.0105	1.0078	1.011
Percent difference from Y					0.05%

CLIENT	: Rayonier	Balance ID:	Mettler AE163
WESTON W.O. No.	: 05565.008.010	Density of Acetone (g/mL):	0.7848
Date Analyzed	: 4/16/09	Lab Ambient Temp (F):	68.7
Analyst	: SBrown	Lab Rel Humidity (%):	48
		Barometric Pressure (Hg):	30.06

Source	BFB Boiler			
Operating Mode/Condition	Bark w/ 60 ODTD Sludge			
Field Run No.	**ONE**	**TWO**	**THREE**	**FIELD BLANK**
LIQUID FRACTION				
Probe Wash ID				
Beaker ID	45-03	46-03	47-03	40-03
Liquid Volume (mL)	90	95	75	200
Initial Beaker Weights (g)				
Weight #1	123.5208	109.7059	116.3972	100.9652
Weight #2	123.5208	109.7060	116.3971	100.9653
Average Initial Weight (g)	**123.5208**	**109.7060**	**116.3972**	**100.9653**
Final Beaker Weights (g)				
Weight #1	123.5395	109.7187	116.4163	100.9660
Weight #2	123.5397	109.7188	116.4168	100.9658
Average Final Weight (g)	**123.5396**	**109.7188**	**116.4166**	**100.9659**
Final-Initial Beaker Wts. (g)	0.0188	0.0128	0.0194	0.0006
Sample/Blank Volume Ratio	0.4500	0.4750	0.3750	
Liquid Blank Correction (g)	0.0003	0.0003	0.0002	
Liquid Particulate Weight (g)	**0.0185**	**0.0125**	**0.0192**	**0.0006**
FILTER FRACTION				
Filter ID	**DA 0634**	**DA 0636**	**DA 0637**	**DA 0635**
Initial Filter Weights (g)				
Weight #1	33.5520	38.5703	38.9667	36.4322
Weight #2	33.5518	38.5699	38.9666	36.4320
Average Initial Weight (g)	**33.5519**	**38.5701**	**38.9667**	**36.4321**
Final Filter Weights (g)				
Weight #1	33.5667	38.5879	38.9899	36.4318
Weight #2	33.5669	38.5877	38.9901	36.4321
Average Final Weight (g)	**33.5668**	**38.5878**	**38.9900**	**36.4320**
Final-Initial Filter Wts. (g)	0.0149	0.0177	0.0233	-0.0001
Filter Blank (g)	-0.0001	-0.0001	-0.0001	
Filter Particulate Weight (g)	**0.0149**	**0.0177**	**0.0233**	
SUMMARY				
Filter Particulate Weight (g)	**0.0149**	**0.0177**	**0.0233**	
Liquid Particulate Weight (g)	**0.0185**	**0.0125**	**0.0192**	
Net Particulate Weight (g)	**0.0334**	**0.0302**	**0.0425**	

Sample Recovery Solution Acetone

Weight Percent of Blank Liquid Fraction 0.0004%

Note: If the blank liquid fraction has a residue weight percent of greater than 0.001 percent, then the samples are not blank corrected.

DA0634

ISOKINETIC FIELD DATA SHEET — EPA Method 5

Page 1 of 1

		Stack Conditions	Assumed	Actual					
Client	Rayonier				Meter Box ID	4013		K Factor	2.27
W.O.#	05565.008.010				Meter Box Y	1.011			
Project ID	Ray	% Moisture			Meter Box Del H	1.670	**Leak Checks**	Initial	Mid-Point / Final
Mode/Source ID	Comp	Impinger Vol (ml)		208	Probe ID / Length	PRSL 5	Sample Train (ft^3)	0.005	0.005
Samp. Loc. ID	BFB	Silica gel (g)		7.7	Probe Material	SS	Leak Check @ (in Hg)	15	7
Run No.ID	1	CO2, % by Vol		13.1	Pitot / Thermocouple ID	P18	Pitot good	yes / no	yes / no
Test Method ID	M5	O2, % by Vol		7.1	Pitot Coefficient	0.84	Orsat good	yes / no	yes / no
Date ID	4/16/09	Temperature (°F)			Nozzle ID	27	**Temp Check**	Pre-Test Set	Post-Test Set
Source/Location	BFB	Meter Temp (°F)			Avg Nozzle Dia (in)	.270	Meter Box Temp		
Sample Date	4/16/09	Static Press (in H_2O)		-.75	Area of Stack (ft^2)	78.54	Reference Temp		
Baro. Press (in Hg)	30.06				Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	BC	Ambient Temp (°F)		65	Total Traverse Pts	24	Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER TEMP	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	CO2 % by Vol	COMMENTS
	0	922			172.580									
A1	2.5		.65	1.48	172.4	378	68	n/a	240	240	60	4	255	
2	5		.52	1.18	174.0	378	70		240	240	60	4	255	
3	7.5		.43	.98	175.4	378	72		240	240	58	4	260	
4	10		.44	1.00	176.8	378	72		240	240	57	4	265	
5	12.5		.50	1.14	178.3	368	73		240	240	57	4	264	
6	15		.45	1.02	179.614	365	73		240	241	57	4	261	
B1	17.5		.72	1.63	181.3	375	72		240	240	58	5	250	
2	20		.68	1.54	183.0	381	73		240	240	57	5	263	
3	22.5		.55	1.25	184.6	381	74		240	240	55	5	261	
4	25		.60	1.36	186.1	381	74		240	240	55	5	260	
5	27.5		.44	1.00	187.5	378	74		240	241	54	5	261	
6	30		.33	.75	188.739	350	76		241	241	54	4	262	
C1	32.5		.64	1.45	190.4	378	71		242	241	57	6	260	
2	35		.54	1.23	192.0	377	74		241	242	55	6	262	
3	37.5		.46	1.04	193.4	376	74		241	242	55	5	260	
4	40		.40	.91	194.7	374	74		240	241	55	5	262	
5	42.5		.33	.75	195.9	368	74		240	242	55	5	260	
6	45		.29	.66	197.135	364	74		240	242	55	5	261	
D1	47.5		.65	1.48	198.8	373	71		240	242	55	5	262	
2	50		.54	1.23	200.3	378	75		240	241	56	6	262	
3	52.5		.35	.79	201.5	378	75		240	241	56	6	260	
4	55		.39	.89	202.9	376	75		240	242	58	5	259	
5	57.5		.34	.77	204.1	372	79		240	242	57	5	259	
6	60	1030	.30	.68	205.324	363	75		240	242	57	5	259	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.6874	1.0921	34.744	373.7	73.2		240/242	240/242	60	6	264	
			.41208	Avg Sqrt Del H 1.03560	Comments:									

Isa-100.4
mv.51 - 22.6

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DA0636

ISOKINETIC FIELD DATA SHEET — EPA Method 5

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		Stack Conditions	Assumed	Actual					
Client	Rayonier				Meter Box ID	A013		K Factor	2.30
W.O.#	05565.008.010				Meter Box Y	1.011			
Project ID	Ray	% Moisture			Meter Box Del H	1.470	**Leak Checks**	Initial	Mid-Point / Final
Mode/Source ID	6-no	Impinger Vol (ml)		188	Probe ID / Length	P-250 / 5'	Sample Train (ft^3)	0.5	/ 0.0
Samp. Loc. ID	BFB	Silica gel (g)		8.3	Probe Material	SS	Leak Check @ (in Hg)	15	/ 7
Run No.ID	2	CO2, % by Vol		13.2	Pitot / Thermocouple ID	P-18	Pitot good	(yes) / no	yes / no / (yes) / no
Test Method ID	M5	O2, % by Vol		6.9	Pitot Coefficient	0.84	Orsat good	(yes) / no	yes / no / (yes) / no
Date ID	4-16-09	Temperature (°F)			Nozzle ID	.27	**Temp Check**	Pre-Test Set	Post-Test Set
Source/Location	BFB	Meter Temp (°F)			Avg Nozzle Dia (in)	.270	Meter Box Temp		
Sample Date	4-16-09	Static Press (in H_2O)		-.71	Area of Stack (ft^2)	78.54	Reference Temp		
Baro. Press (in Hg)	30.26				Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	MC	Ambient Temp (°F)		69	Total Traverse Pts	24	Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)		IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	STACK TEMP (°F)	COMMENTS
	0	1100			206.600									
A1	2.5		.64	1.47	208.3	374	69	n/a	240	240	68	4	241	
2	5		.57	1.31	210.1	374	72		240	240	62	4	240	
3	7.5		.421	1.01	211.4	373	73		240	240	61	4	241	
4	10		.35	.81	212.7	371	73		240	241	61	4	242	
5	12.5		.33	.76	213.9	367	72		240	240	61	4	244	
6	15		.31	.71	215.138	356	72		240	241	61	4	242	
B1	17.5		.60	1.39	216.7	371	69		240	240	61	5	240	
2	20		.50	1.15	218.2	371	72		240	240	62	4	241	
3	22.5		.44	1.01	219.7	370	73		240	241	59	4	252	
4	25		.35	.81	221.0	366	73		240	240	58	4	255	
5	27.5		.35	.81	222.2	366	73		240	241	58	4	252	
6	30		.38	.69	223.441	357	73		240	240	58	4	251	
C1	32.5		.65	1.50	225.1	372	74		241	240	59	4	240	
2	35		.57	1.31	226.4	374	72		238	240	57	5	255	
3	37.5		.55	1.27	227.5	374	72		238	240	56	4	260	
4	40		.50	1.15	229.9	372	72		242	239	56	4	261	
5	42.5		.47	1.08	231.6	366	72		242	239	57	4	260	
6	45		.31	.71	232.605	350	72		240	240	57	4	261	
D1	47.5		.63	1.45	234.3	374	70		242	241	58	5	260	
2	50		.60	1.38	235.9	375	71		240	241	57	5	257	
3	52.5		.55	1.27	237.6	375	72		241	239	57	5	261	
4	55		.48	1.10	239.1	375	72		240	240	57	5	260	
5	57.5		.50	1.15	240.5	373	72		240	241	56	5	258	
6	60	1247	.45	1.04	241.619	359	72		241	241	54	4	257	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.6854	1.0971	35.019	3680	71.9		228/242	239/241	68	5	276	
			Max. .4767	Avg Sqrt Del H 1.0399	Comments:	369.0								

Tso: 99.4 − 79.3 = 20.9

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ISOKINETIC FIELD DATA SHEET — EPA Method 5

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		Stack Conditions	Assumed	Actual					
Client	Rayonier				Meter Box ID	A013		K Factor	2.3
W.O.#	05565.008.010				Meter Box Y	1.011			
Project ID	Ray	% Moisture			Meter Box Del H	1.470	Leak Checks	Initial	Mid-Point / Final
Mode/Source ID	1&2	Impinger Vol (ml)		240	Probe ID / Length	P-12 5'	Sample Train (ft^3)	.005	/ .004
Samp. Loc. ID	BFB	Silica gel (g)		7.6	Probe Material	SS	Leak Check @ (in Hg)	15	/ 8
Run No.ID	3	CO2, % by Vol		13.2	Pitot / Thermocouple ID	P-12	Pitot good	yes / no	yes / no yes / no
Test Method ID	M5	O2, % by Vol		6.9	Pitot Coefficient	0.84	Orsat good	yes / no	yes / no yes / no
Date ID	4-16-09	Temperature (°F)			Nozzle ID	27	Temp Check	Pre-Test Set	Post-Test Set
Source/Location	BFB	Meter Temp (°F)			Avg Nozzle Dia (in)	.270	Meter Box Temp		
Sample Date	4-16-09	Static Press (in H_2O)		-.71	Area of Stack (ft^2)	78.54	Reference Temp		
Baro. Press (in Hg)	30.06				Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	BR	Ambient Temp (°F)		60	Total Traverse Pts	24	Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (military time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	CYC	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	Orsat	COMMENTS
	0	1239			242.495									
A1	2.5		.60	1.38	244.1	370	65	n/a	240	240	67	4	240	
2	5		.65	1.50	245.9	374	68		241	241	60	5	249	
3	7.5		.57	1.31	247.4	374	69		241	240	60	5	252	
4	10		.55	1.27	249.0	373	69		240	241	52	5	250	
5	12.5		.53	1.22	250.5	360	70		240	241	52	5	251	
6	15		.47	1.08	252.012	350	71		238	242	52	5	249	
B1	17.5		.60	1.38	253.6	371	69		240	241	56	5	245	
2	20		.55	1.27	255.2	371	71		241	242	52	5	249	
3	22.5		.53	1.22	256.7	371	72		240	243	52	5	251	
4	25		.42	.97	258.2	369	72		241	241	52	5	255	
5	27.5		.44	1.01	259.5	366	72		241	242	52	4	251	
6	30		.34	.78	260.821	350	72		240	240	52	4	256	
C1	32.5		.52	1.20	262.3	366	69		240	241	52	4	250	
2	35		.44	1.01	263.8	365	71		241	242	53	5	251	
3	37.5		.40	.92	265.1	364	71		241	242	53	4	252	
4	40		.37	.85	266.4	358	71		240	240	53	4	250	
5	42.5		.31	.71	267.6	348	71		240	239	53	4	252	
6	45		.25	.58	268.721	350	71		238	240	53	4	251	
D1	47.5		.54	1.24	270.2	365	67		240	241	53	4	251	
2	50		.52	1.20	271.7	366	70		240	240	53	4	248	
3	52.5		.43	.99	273.1	366	71		240	240	53	5	245	
4	55		.36	.83	274.4	360	70		241	242	54	4	220	
5	57.5		.35	.81	275.6	364	70		241	242	54	4	251	
6	60	1346	.28	.64	276.900	345	70		242	240	56	4	252	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.6727	1.0571	34.405	363.2	70.1		238/242	239/243	67	5	255	
			.4592	Avg Sqrt Del H 1.0206	Comments:									

Iso=1009 mois=22.0

WESTON MANAGERS DESIGNERS/CONSULTANTS

D-5

40

SAMPLE RECOVERY FIELD DATA

EPA Method 5

Client: Rayonier | W.O. #: 05565.008.010
Location/Plant: Fernandina Beach, FL | Source & Location: BFB

Run No. 1 | Sample Date 4/16/09 | Recovery Date 4/16/09
Sample I.D. BFB | Analyst BR/SB | Filter Number DA0634

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H20	H20	Empty						Silica Gel	
Final	304	102	2						327.3	
Initial	100	100	0						319.6	
Gain	204	2	2					208	7.7	215.7

Impinger Color: Clear | Labeled? Y
Silica Gel Condition: Good | Sealed? Y

Run No. 2 | Sample Date 4-16-09 | Recovery Date 4-16-09
Sample I.D. BFB | Analyst BR/SB | Filter Number DA0636

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H20	H20	Empty						Silica Gel	
Final	282	101	2						333.1	
Initial	100	100	0						324.8	
Gain	182	1	2					188	8.3	196.3

Impinger Color: Clear | Labeled? Y
Silica Gel Condition: Good | Sealed? Y

Run No. 3 | Sample Date 4-16-09 | Recovery Date 4-16-09
Sample I.D. BFB | Analyst BR/SB | Filter Number DA0637

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H20	H20	Empty						Silica Gel	
Final	298	103	2						328.6	
Initial	100	100	0						321	
Gain	198	0	2					200	7.6	207.6

Impinger Color: Clear | Labeled? Y
Silica Gel Condition: Good | Sealed? Y

Check COC for Sample IDs of Media Blanks

WESTON MANAGERS DESIGNERS/CONSULTANTS

RUN DATA

Number 1

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**16 Apr 2009**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
	Starting time 11:12			
	Run 1 Compliance			
11:12:18	2433	7.1	4354	13.1
11:12:28	2434	7.1	4351	13.1
11:12:38	2439	7.1	4353	13.1
11:12:48	2440	7.2	4356	13.1
11:12:59	2438	7.1	4356	13.1
11:13:09	2441	7.2	4354	13.1
11:13:19	2437	7.1	4358	13.1
11:13:29	2436	7.1	4354	13.1
11:13:39	2439	7.1	4355	13.1
11:13:49	2439	7.1	4353	13.1
11:13:59	2441	7.2	4352	13.1
Run Avg	**2438**	**7.1**	**4354**	**13.1**

RUN DATA

Number 2

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**16 Apr 2009**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 12:48				
Run 2 Compliance				
12:48:30	2357	6.9	4403	13.2
12:48:40	2355	6.9	4396	13.2
12:48:50	2353	6.9	4397	13.2
12:49:00	2360	6.9	4396	13.2
12:49:10	2359	6.9	4398	13.2
12:49:20	2356	6.9	4399	13.2
12:49:30	2358	6.9	4400	13.2
12:49:40	2355	6.9	4401	13.2
12:49:50	2353	6.9	4395	13.2
12:50:00	2355	6.9	4399	13.2
Run Avg	**2356**	**6.9**	**4398**	**13.2**

RUN DATA

Number 3

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**16 Apr 2009**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 14:07				
Run 3 Compliance				
14:07:28	2369	6.9	4371	13.1
14:07:37	2360	6.9	4387	13.2
14:07:47	2363	6.9	4395	13.2
14:07:57	2365	6.9	4401	13.2
14:08:07	2361	6.9	4398	13.2
14:08:17	2361	6.9	4404	13.2
14:08:27	2369	6.9	4401	13.2
14:08:37	2361	6.9	4398	13.2
14:08:47	2369	6.9	4402	13.2
14:08:58	2362	6.9	4399	13.2
14:09:08	2361	6.9	4403	13.2
14:09:18	2362	6.9	4402	13.2
Run Avg	**2364**	**6.9**	**4397**	**13.2**

CALIBRATION

Number 1

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**16 Apr 2009**

Starting Time: 08:09

O2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	-4
12.0	CC 159811	4091
25.9	SG0067	8869

Curve Coefficients

Slope	Intercept	Corr. Coeff.
342.6	-9.9	>0.9999

CO2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	2
12.1	CC 159811	3966
24.4	SG0067	8169

Curve Coefficients

Slope	Intercept	Corr. Coeff.
334.8	-26.9	0.9999

CALIBRATION ERROR

Number 1

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**16 Apr 2009**

Starting Time: 08:09

O2

Method: EPA 3A

Slope 342.6 **Intercept** -9.9

Standard, %	Response, mV	%	Error, %
Zero	-4	0.0	0.0
12.0	4091	12.0	0.0
25.9	8869	25.9	0.0

CO2

Method: EPA 3A

Slope 334.8 **Intercept** -26.9

Standard, %	Response, mV	%	Error, %
Zero	2	0.1	0.4
12.1	3966	11.9	-0.8
24.4	8169	24.5	0.4

ANALYZER INFORMATION

Client:	**Rayonier**	Project Number:	**05565.008.010**
Location:	**Fernandina Beach, Fl**	Operator:	**BR**
Source:	**BFB**	Date:	**15 Apr 2009**

File Name: C:\DATA\Rayonier Fernandina\BFB O2Bags 16 April 2009.cem
Computer: WSAUB58 **Trailer:** 201

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	**O2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900 SN: 652836**
Full-Scale Output, mv	**10000**
Span Concentration, %	**25.9**

Channel 2

Analyte	**CO2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900 SN: 652836**
Full-Scale Output, mv	**10000**
Span Concentration, %	**24.4**

APPENDIX E
QUALITY CONTROL DATA

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 12/16/08 | METER SERIAL #: 971165 | BAROMETRIC PRESSURE (in Hg): INITIAL 29.52, FINAL 29.52, AVG (P_{bar}) 29.52

METER PART #: AO13 | CRITICAL ORIFICE SET SERIAL #: 1331s | Calibrated by: LoF

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	AMBIENT F°	DGM F° INITIAL	DGM F° FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	(4) $\Delta H_@$
12	1	0.3275	22	606.135	617.641	11.506	64	65	65	65	27	0.52	11.434	11.407	0.998	1.639
16	2	0.4379	25	654.328	680.262	25.934	66	70	67	69	46	0.93	25.627	25.935	1.012	1.646
19	3	0.5175	19	682.245	703.330	21.085	65	67	68	68	32	1.30	20.894	21.342	1.021	1.644
25	4	0.6784	17	704.732	727.517	22.785	65	68	70	69	26	2.30	22.571	22.731	1.007	1.693
31	5	0.8269	15	623.122	653.738	30.616	64	67	71	69	29	3.50	30.418	30.934	1.017	1.730
														AVG =	1.011	1.670

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

Individual Y's .02 from average? YES

Individual $\Delta H_@$ values 0.2 from average? YES

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

Next Calibration Due By: 12/16/2009

(4) $\Delta H_@ = \left(\frac{0.75\,\theta^2}{V_{cr}(std)}\right) \Delta H$

Post-Test Meter Calibration Check

Rayonier 05565.008.010
Fernandina Beach BFB Boiler
Bark w/ 60 ODTD Sludge

POST-TEST METER Y CALIBRATION CHECK

Meter ID: AO 13

Run Number		1	2	3	Mean
Sampling Time, min	(Theta)	60	60	60	60
Meter Volume, ft^3	(Vm)	34.744	35.019	34.405	34.723
Meter Temperature, R	(tm)	533	532	530	532
Barometric Pressure, in. Hg	(Pb)	30.06	30.06	30.06	30.06
Meter Orifice Pressure, in. H_2O	(dH)	1.092	1.097	1.057	1.082
Meter Pressure, in. Hg	(Pm)	30.14	30.14	30.14	30.14
Ave Sq Rt Meter Orifice Pressure, in. H_2O	((sqrt. dH)ave	1.036	1.040	1.021	1.032
Meter Orifice Calibraion Coefficient, in. H_2O	(dH@)	1.67	1.67	1.67	1.670
Dry Mol. Wt. of Stack Gas, lb/lb-mole	(Md)	30.38	30.39	30.39	30.39
Dry Gas Meter Cal. Check Value	(Yqa)	1.0161	1.0105	1.0078	1.0115
Meter Correction Factor	(Y)	1.0110	1.0110	1.0110	1.0110
Mean Percent Difference, %	< +/- 5%				**0.05**

Post-Test Meter Calibration Check

Rayonier
Fernandina Beach

05565.008.010
BFB Boiler
Bark w/ 45 ODTD Sludge

POST-TEST METER Y CALIBRATION CHECK

Meter ID: AO 13

Run Number		1	2	3	Mean
Sampling Time, min	(Theta)	60	60	60	60
Meter Volume, ft^3	(Vm)	36.625	36.892	34.790	36.102
Meter Temperature, R	(tm)	554	557	556	556
Barometric Pressure, in. Hg	(Pb)	29.94	29.94	29.94	29.94
Meter Orifice Pressure, in. H_2O	(dH)	1.159	1.176	1.053	1.129
Meter Pressure, in. Hg	(Pm)	30.03	30.03	30.02	30.02
Ave Sq Rt Meter Orifice Pressure, in. H_2O	((sqrt. dH)ave	1.067	1.072	1.017	1.052
Meter Orifice Calibraion Coefficient, in. H_2O	(dH@)	1.67	1.67	1.67	1.670
Dry Mol. Wt. of Stack Gas, lb/lb-mole	(Md)	30.39	30.39	30.37	30.38
Dry Gas Meter Cal. Check Value	(Yqa)	1.0131	1.0142	1.0193	1.0155
Meter Correction Factor	(Y)	1.0110	1.0110	1.0110	1.0110
Mean Percent Difference, %	< +/- 5%				**0.45**

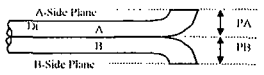
S - Type Pitot Tube Inspection Data Form

Pitot Tube ID NO. P18 *Length 5'* Probe ID.No. AUB-PR-5L

If all Criteria PASS Cp is equal to 0.84

Inspection Date 12/19/2008 Individual Conducting Inspection MTF

PASS/FAIL

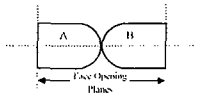


Distance to A Plane (PA) - inches 0.471 PASS

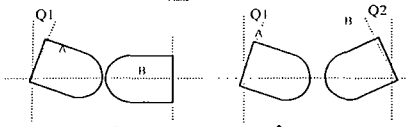
Distance to B Plane (PB) - inches 0.471 PASS

Pitot OD (D_t) - inches 0.375

$1.05\ D_t < P < 1.5\ D_t$ PA must Equal PB



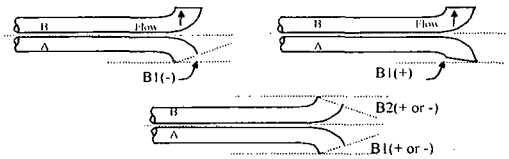
Are Open Faces Aligned Perpendicular to the Tube Axis ◉ YES ○ NO PASS



Angle of Q1 from vertical A Tube- degrees (absolute) 1 PASS

Angle of Q2 from vertical B Tube- degrees (absolute) 1 PASS

Q1 and Q2 must be ≤ 10°

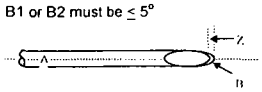


Angle of B1 from vertical A Tube- degrees (absolute) 1 PASS

Angle of B1 from vertical B Tube- degrees (absolute) 1 PASS

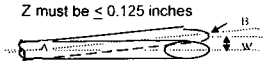
B1 or B2 must be ≤ 5°

Y = 2 O = 1



A = 0.942

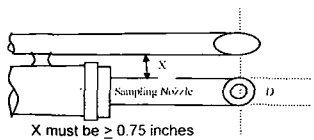
Z must be ≤ 0.125 inches



Z = A sin Y = 0.0329 PASS

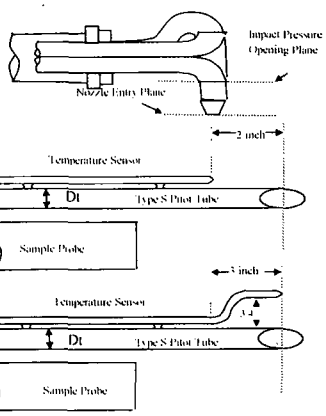
W must be ≤ 0.03125 inches

W = A sin O = 0.0164 PASS



X must be ≥ 0.75 inches

Distance between Sample Nozzle and Pitot (X) - inches 0.75 PASS



Impact Pressure Opening Plane is above the Nozzle Entry Plane ◉ YES ○ NO ○ NA PASS

Thermocouple meets the Distance Criteria in the adjacent figure ○ YES ○ NO ◉ NA

Thermocouple meets the Distance Criteria in the adjacent figure ◉ YES ○ NO ○ NA PASS

POSTTEST CHECK

Client _____ Work Order Number _____

Date _____ Damage Found? _____ YES _____ NO

Checked By _____

STACK TEMPERATURE SENSOR CALIBRATION DATA

Thermocouple Number: AUB-PR-5L Length: 5 FT
Date: 13-Dec-07 Pitot: P18
Ambient Temperature,°F : 73
Calibrator: KMR

Reference Point Number	Reference Temperature ° F	Thermocouple Temperature ° F	Temperature Difference %
1 - A	73	73	0.00
B	41	42	0.20
C	202	203	0.15
2 - A	73	73	0.00
B	41	42	0.20
C	202	203	0.15
3 - A	73	73	0.00
B	41	42	0.20
C	202	203	0.15

$$\text{Temp Diff (\%)} = \left| \frac{(\text{Ref Temp, °F} + 460) - (\text{Therm Temp °F} + 460)}{\text{Ref Temp,° F} + 460} \right| \times 100$$

Are all temperature differences less than +/- 1.5% ? YES

POSTTEST STACK TEMPERATURE SENSOR CALIBRATION DATA

Client: _____
Work Order Number: _____
Date: _____
Calibrator: _____

Ambient Temp,° F	Reference Temp.° F	Thermocouple Temp,° F	Temperature Diff, %
_____	_____	_____	_____

Was a pretest temperature correction used ? _____yes _____no
Is temperature difference within +/- 1.5% _____yes _____no
If no, calculations done once with recorded values and once with corrected values _____

APPENDIX F
PROCESS OPERATING DATA

BFB BOILER

4-15-09

		F Factor	Ave Steam
1005-1107	ENG RUN 1	9602	282
1157-1303	COMP RUN 1	9605	279
1347-1455	COMP RUN 2	9608	283
1535-1642	COMP RUN 3	9610	281

4-16-09

0922-1030	COMP RUN 1	9604	274
1100-1207	COMP RUN 2	9608	285
1239-1346	COMP RUN 3	9604	277

Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	10:08:38 AM
Test Run Number:	1
Start or Finish	Start

Boiler Data

Bark Totalizer	219.71	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	63.38	Pct
Boiler Steam Integrator	955.44	
Boiler Steam Outlet Pres.	913.28	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	273.78	KPPH
Boiler O2	3.75	%
Boiler Steam Temp.	877.98	DegF
Boiler Gen Bank Temp.	846.38	DegF

Scrubber Data

Scrubber pH	8.46	pH
Scrubber Inlet Temp.	391.57	DegF
Scrubber Recirc Flow	678.28	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.09	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	228.65	KSCFM
Stack Flow Adj.	98.70	DKSCFM
Stack Temp	373.46	DegF
Oxygen Adj. Value	6.56	PCT
CO Adj. Value	56.81	PPM
NOx Adj. Value	123.86	PPM
SO2 Adj. Value	59.75	PPM
OPACITY VALUE	2.47	PCT

Precipitator Data

T/R #1 Second voltage	29.00	KVDC
T/R #1 Second amps	305.00	mA
T/R #2 Second voltage	29.00	KVDC
T/R #2 Second amps	200.00	mA
T/R #3 Second voltage	36.00	KVDC
T/R #3 Second amps	760.00	mA
T/R #4 Second voltage	43.00	KVDC
T/R #4 Second amps	595.00	mA

[redacted]

Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	11:13:46 AM
Test Run Number:	1
Start or Finish	finish

Boiler Data

Bark Totalizer	283.11	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	65.34	Pct
Boiler Steam Integrator	1262.04	
Boiler Steam Outlet Pres.	899.67	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	266.01	KPPH
Boiler O2	4.35	%
Boiler Steam Temp.	869.93	DegF
Boiler Gen Bank Temp.	851.66	DegF

Scrubber Data

Scrubber pH	8.91	pH
Scrubber Inlet Temp.	396.18	DegF
Scrubber Recirc Flow	246.50	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.15	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	231.62	KSCFM
Stack Flow Adj.	98.99	DKSCFM
Stack Temp	376.69	DegF
Oxygen Adj. Value	7.12	PCT
CO Adj. Value	59.59	PPM
NOx Adj. Value	134.38	PPM
SO2 Adj. Value	53.00	PPM
OPACITY VALUE	2.35	PCT

Precipitator Data

T/R #1 Second voltage	30.00	KVDC
T/R #1 Second amps	260.00	mA
T/R #2 Second voltage	29.00	KVDC
T/R #2 Second amps	155.00	mA
T/R #3 Second voltage	30.00	KVDC
T/R #3 Second amps	455.00	mA
T/R #4 Second voltage	37.00	KVDC
T/R #4 Second amps	415.00	mA

Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	12:02:37 PM
Test Run Number:	2
Start or Finish	Start

Boiler Data

Bark Totalizer	333.19	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	69.79	Pct
Boiler Steam Integrator	1480.12	
Boiler Steam Outlet Pres.	909.98	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	260.51	KPPH
Boiler O2	4.69	%
Boiler Steam Temp.	889.71	DegF
Boiler Gen Bank Temp.	842.22	DegF

Scrubber Data

Scrubber pH	8.98	pH
Scrubber Inlet Temp.	395.05	DegF
Scrubber Recirc Flow	186.34	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.22	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	245.77	KSCFM
Stack Flow Adj.	105.79	DKSCFM
Stack Temp	375.04	DegF
Oxygen Adj. Value	6.48	PCT
CO Adj. Value	70.09	PPM
NOx Adj. Value	152.84	PPM
SO2 Adj. Value	108.50	PPM
OPACITY VALUE	2.72	PCT

Precipitator Data

T/R #1 Second voltage	29.00	KVDC
T/R #1 Second amps	190.00	mA
T/R #2 Second voltage	34.00	KVDC
T/R #2 Second amps	295.00	mA
T/R #3 Second voltage	35.00	KVDC
T/R #3 Second amps	700.00	mA
T/R #4 Second voltage	42.00	KVDC
T/R #4 Second amps	620.00	mA

Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	1:06:45 PM
Test Run Number:	2
Start or Finish	finish

Boiler Data

Bark Totalizer	391.57	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	72.25	Pct
Boiler Steam Integrator	1777.72	
Boiler Steam Outlet Pres.	900.11	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	287.72	KPPH
Boiler O2	4.00	%
Boiler Steam Temp.	878.65	DegF
Boiler Gen Bank Temp.	849.85	DegF

Scrubber Data

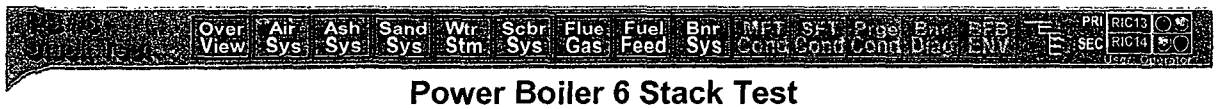
Scrubber pH	9.01	pH
Scrubber Inlet Temp.	393.21	DegF
Scrubber Recirc Flow	917.61	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.29	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	253.88	KSCFM
Stack Flow Adj.	109.19	DKSCFM
Stack Temp	374.59	DegF
Oxygen Adj. Value	6.82	PCT
CO Adj. Value	46.93	PPM
NOx Adj. Value	128.74	PPM
SO2 Adj. Value	105.00	PPM
OPACITY VALUE	2.72	PCT

Precipitator Data

T/R #1 Second voltage	30.00	KVDC
T/R #1 Second amps	215.00	mA
T/R #2 Second voltage	29.00	KVDC
T/R #2 Second amps	135.00	mA
T/R #3 Second voltage	32.00	KVDC
T/R #3 Second amps	410.00	mA
T/R #4 Second voltage	39.00	KVDC
T/R #4 Second amps	465.00	mA



Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	1:48:18 PM
Test Run Number:	3
Start or Finish	start

Boiler Data

Bark Totalizer	433.16	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	81.25	Pct
Boiler Steam Integrator	1961.36	
Boiler Steam Outlet Pres.	884.54	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	259.71	KPPH
Boiler O2	4.25	%
Boiler Steam Temp.	865.91	DegF
Boiler Gen Bank Temp.	818.01	DegF

Scrubber Data

Scrubber pH	8.89	pH
Scrubber Inlet Temp.	392.00	DegF
Scrubber Recirc Flow	0.00	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.11	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	228.14	KSCFM
Stack Flow Adj.	97.99	DKSCFM
Stack Temp	372.71	DegF
Oxygen Adj. Value	7.56	PCT
CO Adj. Value	84.09	PPM
NOx Adj. Value	121.61	PPM
SO2 Adj. Value	85.00	PPM
OPACITY VALUE	2.54	PCT

Precipitator Data

T/R #1 Second voltage	33.00	KVDC
T/R #1 Second amps	305.00	mA
T/R #2 Second voltage	34.00	KVDC
T/R #2 Second amps	250.00	mA
T/R #3 Second voltage	38.00	KVDC
T/R #3 Second amps	855.00	mA
T/R #4 Second voltage	45.00	KVDC
T/R #4 Second amps	710.00	mA

Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	3:14:26 PM
Test Run Number:	3
Start or Finish	finish

Boiler Data

Bark Totalizer	527.38	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	66.06	Pct
Boiler Steam Integrator	2366.35	
Boiler Steam Outlet Pres.	906.27	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	293.60	KPPH
Boiler O2	4.45	%
Boiler Steam Temp.	876.64	DegF
Boiler Gen Bank Temp.	856.38	DegF

Scrubber Data

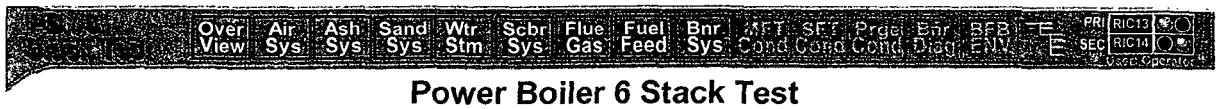
Scrubber pH	9.20	pH
Scrubber Inlet Temp.	393.14	DegF
Scrubber Recirc Flow	228.22	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.32	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	251.05	KSCFM
Stack Flow Adj.	108.00	DKSCFM
Stack Temp	375.95	DegF
Oxygen Adj. Value	6.09	PCT
CO Adj. Value	96.78	PPM
NOx Adj. Value	128.00	PPM
SO2 Adj. Value	82.50	PPM
OPACITY VALUE	3.15	PCT

Precipitator Data

T/R #1 Second voltage	31.00	KVDC
T/R #1 Second amps	255.00	mA
T/R #2 Second voltage	33.00	KVDC
T/R #2 Second amps	165.00	mA
T/R #3 Second voltage	34.00	KVDC
T/R #3 Second amps	535.00	mA
T/R #4 Second voltage	40.00	KVDC
T/R #4 Second amps	520.00	mA



Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	3:39:43 PM
Test Run Number:	4
Start or Finish	start

Boiler Data

Bark Totalizer	561.77	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	51.63	Pct
Boiler Steam Integrator	2476.40	
Boiler Steam Outlet Pres.	898.79	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	243.96	KPPH
Boiler O2	4.03	%
Boiler Steam Temp.	870.93	DegF
Boiler Gen Bank Temp.	824.63	DegF

Scrubber Data

Scrubber pH	9.03	pH
Scrubber Inlet Temp.	388.97	DegF
Scrubber Recirc Flow	0.00	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.05	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	174.07	KSCFM
Stack Flow Adj.	74.38	DKSCFM
Stack Temp	371.94	DegF
Oxygen Adj. Value	7.74	PCT
CO Adj. Value	59.56	PPM
NOx Adj. Value	115.98	PPM
SO2 Adj. Value	72.50	PPM
OPACITY VALUE	2.22	PCT

Precipitator Data

T/R #1 Second voltage	29.00	KVDC
T/R #1 Second amps	170.00	mA
T/R #2 Second voltage	32.00	KVDC
T/R #2 Second amps	155.00	mA
T/R #3 Second voltage	35.00	KVDC
T/R #3 Second amps	625.00	mA
T/R #4 Second voltage	40.00	KVDC
T/R #4 Second amps	500.00	mA

Power Boiler 6 Stack Test

Date:	4/15/2009
Time:	4:45:17 PM
Test Run Number:	4
Start or Finish	finish

Boiler Data

Bark Totalizer	611.45	Tons
Knots Totalizer	0.00	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	67.00	Pct
Boiler Steam Integrator	2785.55	
Boiler Steam Outlet Pres.	897.26	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	289.04	KPPH
Boiler O2	4.47	%
Boiler Steam Temp.	879.32	DegF
Boiler Gen Bank Temp.	865.10	DegF

Scrubber Data

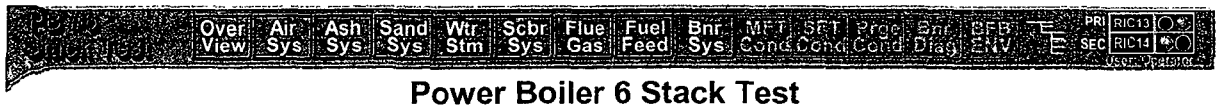
Scrubber pH	9.17	pH
Scrubber Inlet Temp.	395.16	DegF
Scrubber Recirc Flow	0.00	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.31	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	227.83	KSCFM
Stack Flow Adj.	161.86	DKSCFM
Stack Temp	138.80	DegF
Oxygen Adj. Value	6.01	PCT
CO Adj. Value	45.24	PPM
NOx Adj. Value	129.34	PPM
SO2 Adj. Value	73.50	PPM
OPACITY VALUE	2.73	PCT

Precipitator Data

T/R #1 Second voltage	23.00	KVDC
T/R #1 Second amps	55.00	mA
T/R #2 Second voltage	29.00	KVDC
T/R #2 Second amps	50.00	mA
T/R #3 Second voltage	33.00	KVDC
T/R #3 Second amps	315.00	mA
T/R #4 Second voltage	40.00	KVDC
T/R #4 Second amps	430.00	mA



Power Boiler 6 Stack Test

Date:	4/16/2009
Time:	9:26:15 AM
Test Run Number:	1
Start or Finish	start

Boiler Data

Bark Totalizer	209.53	Tons
Knots Totalizer	4.15	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	67.64	Pct
Boiler Steam Integrator	758.98	
Boiler Steam Outlet Pres.	924.64	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	232.79	KPPH
Boiler O2	4.62	%
Boiler Steam Temp.	871.93	DegF
Boiler Gen Bank Temp.	830.68	DegF

Scrubber Data

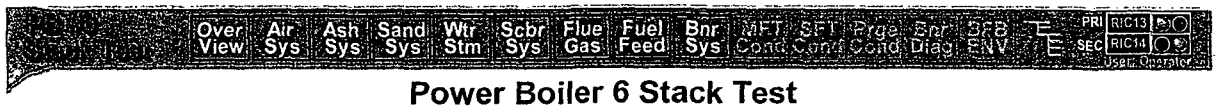
Scrubber pH	9.16	pH
Scrubber Inlet Temp.	394.24	DegF
Scrubber Recirc Flow	0.00	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.32	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	211.23	KSCFM
Stack Flow Adj.	90.22	DKSCFM
Stack Temp	375.96	DegF
Oxygen Adj. Value	5.92	PCT
CO Adj. Value	62.25	PPM
NOx Adj. Value	136.96	PPM
SO2 Adj. Value	53.00	PPM
OPACITY VALUE	2.42	PCT

Precipitator Data

T/R #1 Second voltage	33.00	KVDC
T/R #1 Second amps	460.00	mA
T/R #2 Second voltage	33.00	KVDC
T/R #2 Second amps	300.00	mA
T/R #3 Second voltage	36.00	KVDC
T/R #3 Second amps	700.00	mA
T/R #4 Second voltage	46.00	KVDC
T/R #4 Second amps	650.00	mA



Power Boiler 6 Stack Test

Date:	4/16/2009
Time:	10:33:42 AM
Test Run Number:	1
Start or Finish	finish

Boiler Data

Bark Totalizer	273.99	Tons
Knots Totalizer	4.15	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	75.61	Pct
Boiler Steam Integrator	1067.72	
Boiler Steam Outlet Pres.	892.38	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	264.49	KPPH
Boiler O2	3.89	%
Boiler Steam Temp.	866.25	DegF
Boiler Gen Bank Temp.	834.28	DegF

Scrubber Data

Scrubber pH	9.47	pH
Scrubber Inlet Temp.	395.34	DegF
Scrubber Recirc Flow	551.20	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.13	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	220.44	KSCFM
Stack Flow Adj.	94.14	DKSCFM
Stack Temp	376.29	DegF
Oxygen Adj. Value	5.50	PCT
CO Adj. Value	128.55	PPM
NOx Adj. Value	121.84	PPM
SO2 Adj. Value	63.50	PPM
OPACITY VALUE	2.60	PCT

Precipitator Data

T/R #1 Second voltage	31.00	KVDC
T/R #1 Second amps	295.00	mA
T/R #2 Second voltage	35.00	KVDC
T/R #2 Second amps	330.00	mA
T/R #3 Second voltage	40.00	KVDC
T/R #3 Second amps	970.00	mA
T/R #4 Second voltage	44.00	KVDC
T/R #4 Second amps	625.00	mA

Power Boiler 6 Stack Test

Date:	4/16/2009
Time:	11:01:32 AM
Test Run Number:	2
Start or Finish	start

Boiler Data

Bark Totalizer	310.18	Tons
Knots Totalizer	4.15	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	70.70	Pct
Boiler Steam Integrator	1202.69	
Boiler Steam Outlet Pres.	902.67	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	290.43	KPPH
Boiler O2	3.63	%
Boiler Steam Temp.	877.31	DegF
Boiler Gen Bank Temp.	859.70	DegF

Scrubber Data

Scrubber pH	9.34	pH
Scrubber Inlet Temp.	397.64	DegF
Scrubber Recirc Flow	208.33	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.22	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	254.57	KSCFM
Stack Flow Adj.	109.14	DKSCFM
Stack Temp	374.28	DegF
Oxygen Adj. Value	6.53	PCT
CO Adj. Value	202.37	PPM
NOx Adj. Value	124.75	PPM
SO2 Adj. Value	63.00	PPM
OPACITY VALUE	2.72	PCT

Precipitator Data

T/R #1 Second voltage	30.00	KVDC
T/R #1 Second amps	180.00	mA
T/R #2 Second voltage	31.00	KVDC
T/R #2 Second amps	85.00	mA
T/R #3 Second voltage	32.00	KVDC
T/R #3 Second amps	295.00	mA
T/R #4 Second voltage	41.00	KVDC
T/R #4 Second amps	465.00	mA

Power Boiler 6 Stack Test

Date:	4/16/2009
Time:	12:15:01 PM
Test Run Number:	2
Start or Finish	finish

Boiler Data

Bark Totalizer	378.65	Tons
Knots Totalizer	4.15	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	67.28	Pct
Boiler Steam Integrator	1551.39	
Boiler Steam Outlet Pres.	897.52	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	272.11	KPPH
Boiler O2	3.27	%
Boiler Steam Temp.	868.92	DegF
Boiler Gen Bank Temp.	845.47	DegF

Scrubber Data

Scrubber pH	9.25	pH
Scrubber Inlet Temp.	391.72	DegF
Scrubber Recirc Flow	263.52	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.27	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	214.65	KSCFM
Stack Flow Adj.	91.90	DKSCFM
Stack Temp	370.25	DegF
Oxygen Adj. Value	7.54	PCT
CO Adj. Value	103.07	PPM
NOx Adj. Value	110.38	PPM
SO2 Adj. Value	47.00	PPM
OPACITY VALUE	2.79	PCT

Precipitator Data

T/R #1 Second voltage	30.00	KVDC
T/R #1 Second amps	220.00	mA
T/R #2 Second voltage	26.00	KVDC
T/R #2 Second amps	70.00	mA
T/R #3 Second voltage	34.00	KVDC
T/R #3 Second amps	555.00	mA
T/R #4 Second voltage	41.00	KVDC
T/R #4 Second amps	520.00	mA

Power Boiler 6 Stack Test

Date:	4/16/2009
Time:	12:57:52 PM
Test Run Number:	3
Start or Finish	start

Boiler Data

Bark Totalizer	425.11	Tons
Knots Totalizer	4.15	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	68.56	Pct
Boiler Steam Integrator	1751.27	
Boiler Steam Outlet Pres.	900.31	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	273.68	KPPH
Boiler O2	3.48	%
Boiler Steam Temp.	863.90	DegF
Boiler Gen Bank Temp.	826.30	DegF

Scrubber Data

Scrubber pH	7.84	pH
Scrubber Inlet Temp.	390.61	DegF
Scrubber Recirc Flow	0.00	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.08	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

Stack Flow	217.61	KSCFM
Stack Flow Adj.	94.35	DKSCFM
Stack Temp	371.08	DegF
Oxygen Adj. Value	7.11	PCT
CO Adj. Value	67.00	PPM
NOx Adj. Value	119.38	PPM
SO2 Adj. Value	58.25	PPM
OPACITY VALUE	2.92	PCT

Precipitator Data

T/R #1 Second voltage	29.00	KVDC
T/R #1 Second amps	165.00	mA
T/R #2 Second voltage	30.00	KVDC
T/R #2 Second amps	85.00	mA
T/R #3 Second voltage	32.00	KVDC
T/R #3 Second amps	355.00	mA
T/R #4 Second voltage	47.00	KVDC
T/R #4 Second amps	750.00	mA

Power Boiler 6 Stack Test

Date:	4/16/2009
Time:	1:50:17 PM
Test Run Number:	3
Start or Finish	finish

Boiler Data

Bark Totalizer	465.15	Tons
Knots Totalizer	4.15	Tons
TDF Totalizer	0.00	Tons
Fuel Screw Speed	70.92	Pct
Boiler Steam Integrator	1992.34	
Boiler Steam Outlet Pres.	901.93	PSI
Boiler #6 Oil Integrator	0.00	Gals
Boiler Steam	286.32	KPPH
Boiler O2	4.08	%
Boiler Steam Temp.	886.36	DegF
Boiler Gen Bank Temp.	840.44	DegF

Scrubber Data

Scrubber pH	9.23	pH
Scrubber Inlet Temp.	392.15	DegF
Scrubber Recirc Flow	0.00	GPM
Scrubber Caustic Flow	0.00	Kg/Min
Scrubber Level	9.32	Feet
Scrubber Media (Off, Effluent, Water)	NONE	

CEMS Data

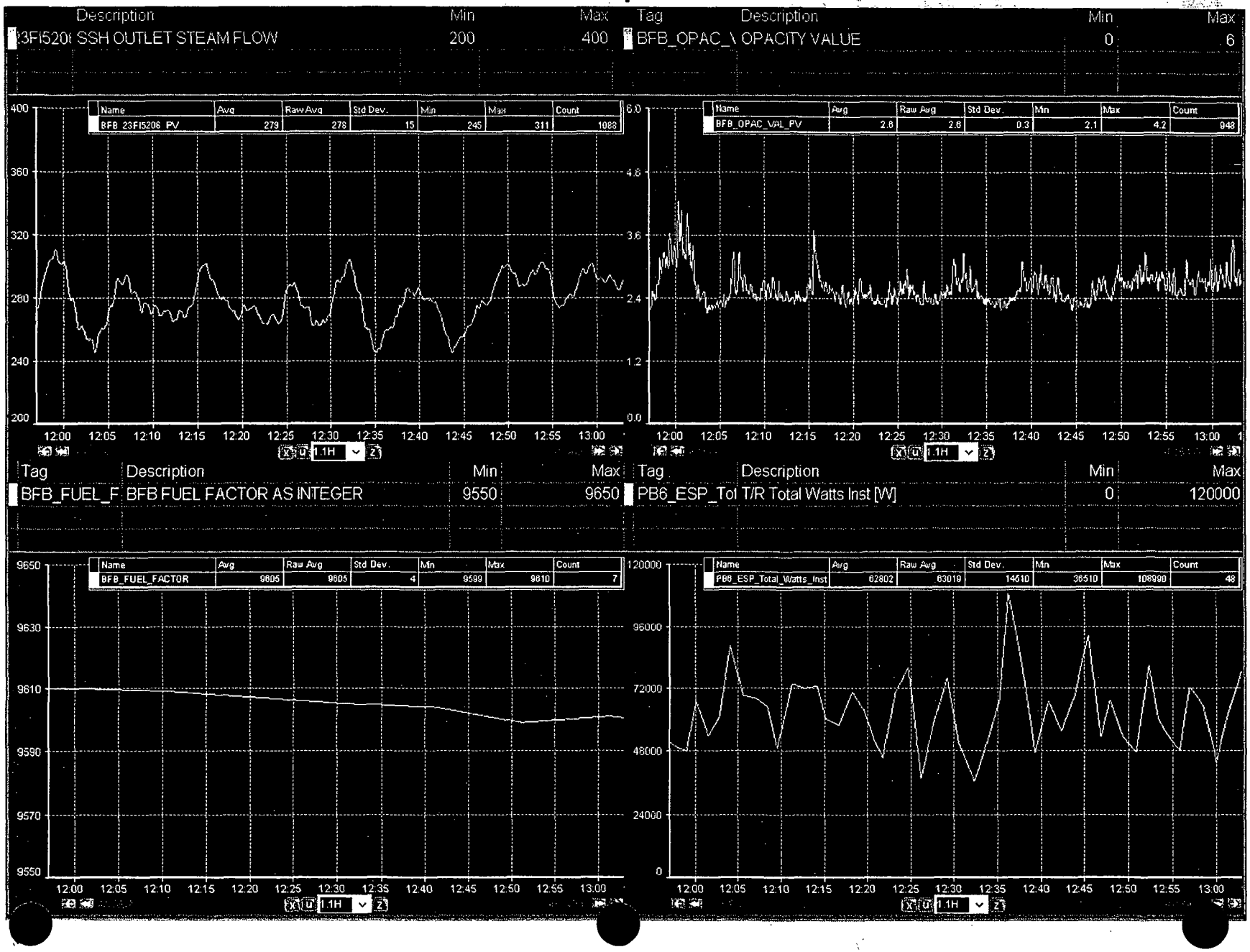
Stack Flow	241.19	KSCFM
Stack Flow Adj.	104.02	DKSCFM
Stack Temp	370.64	DegF
Oxygen Adj. Value	7.04	PCT
CO Adj. Value	64.20	PPM
NOx Adj. Value	118.92	PPM
SO2 Adj. Value	75.00	PPM
OPACITY VALUE	3.46	PCT

Precipitator Data

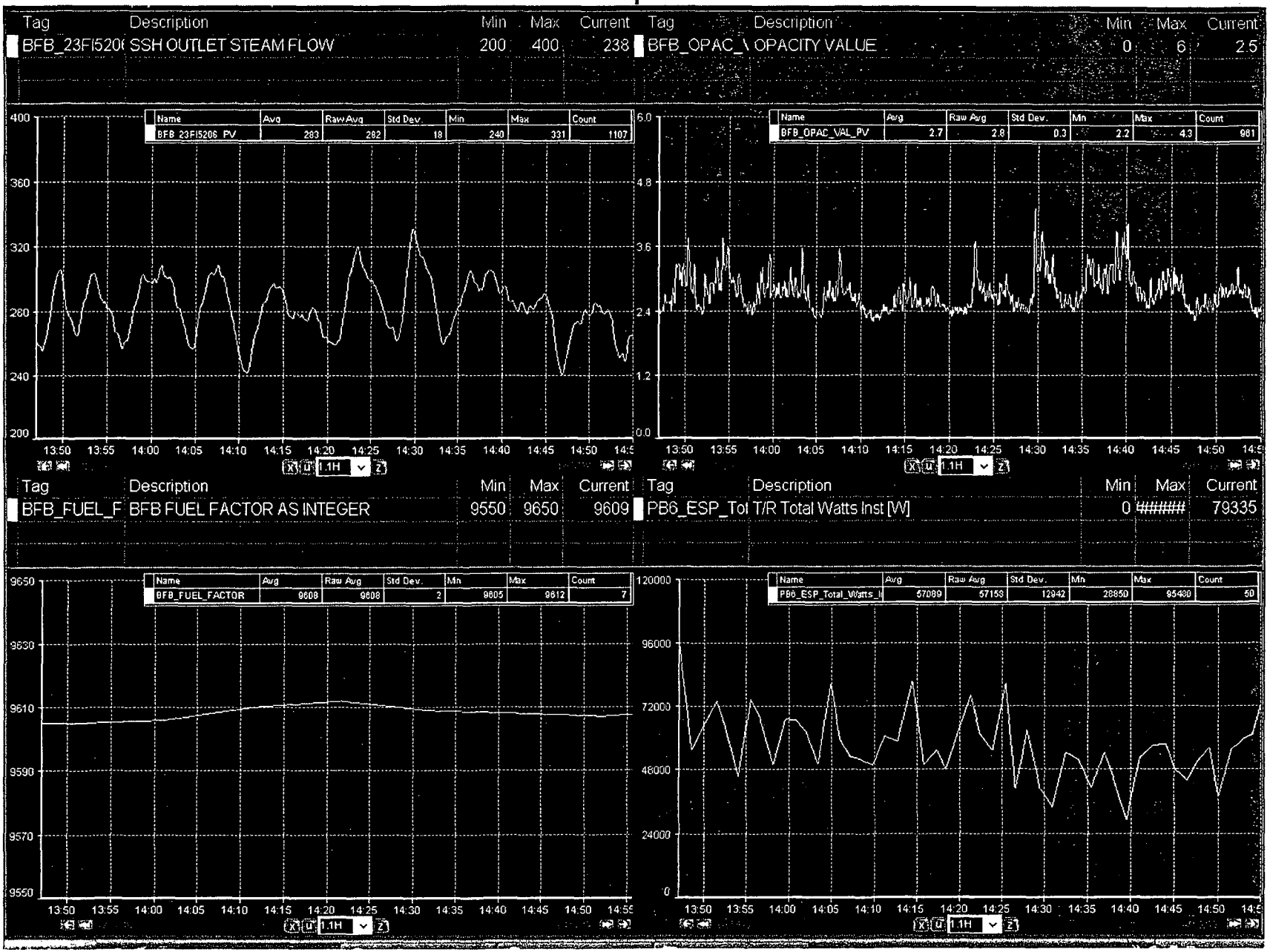
T/R #1 Second voltage	30.00	KVDC
T/R #1 Second amps	195.00	mA
T/R #2 Second voltage	35.00	KVDC
T/R #2 Second amps	190.00	mA
T/R #3 Second voltage	28.00	KVDC
T/R #3 Second amps	195.00	mA
T/R #4 Second voltage	44.00	KVDC
T/R #4 Second amps	615.00	mA

[redacted]

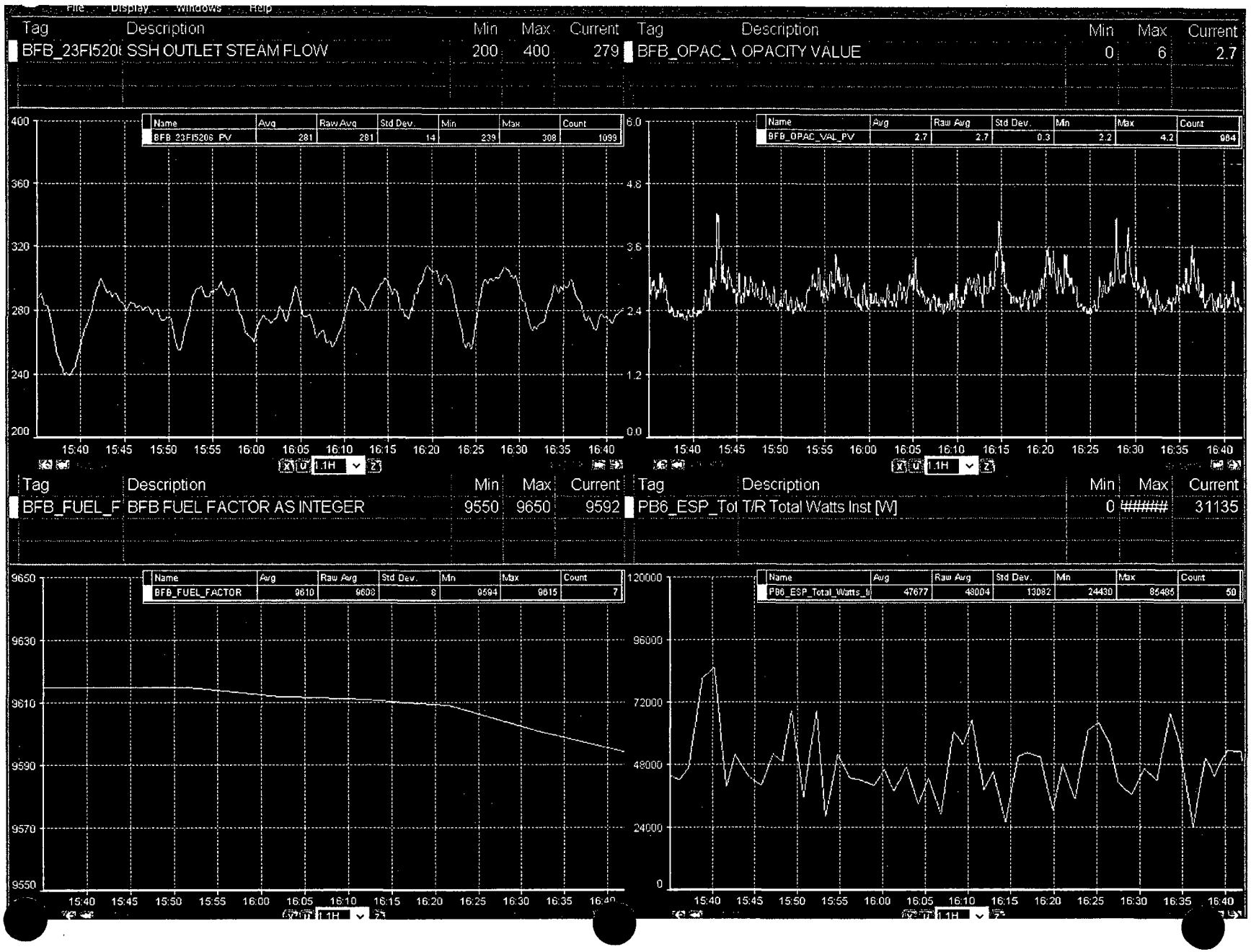
4/15 -Comp Run 1



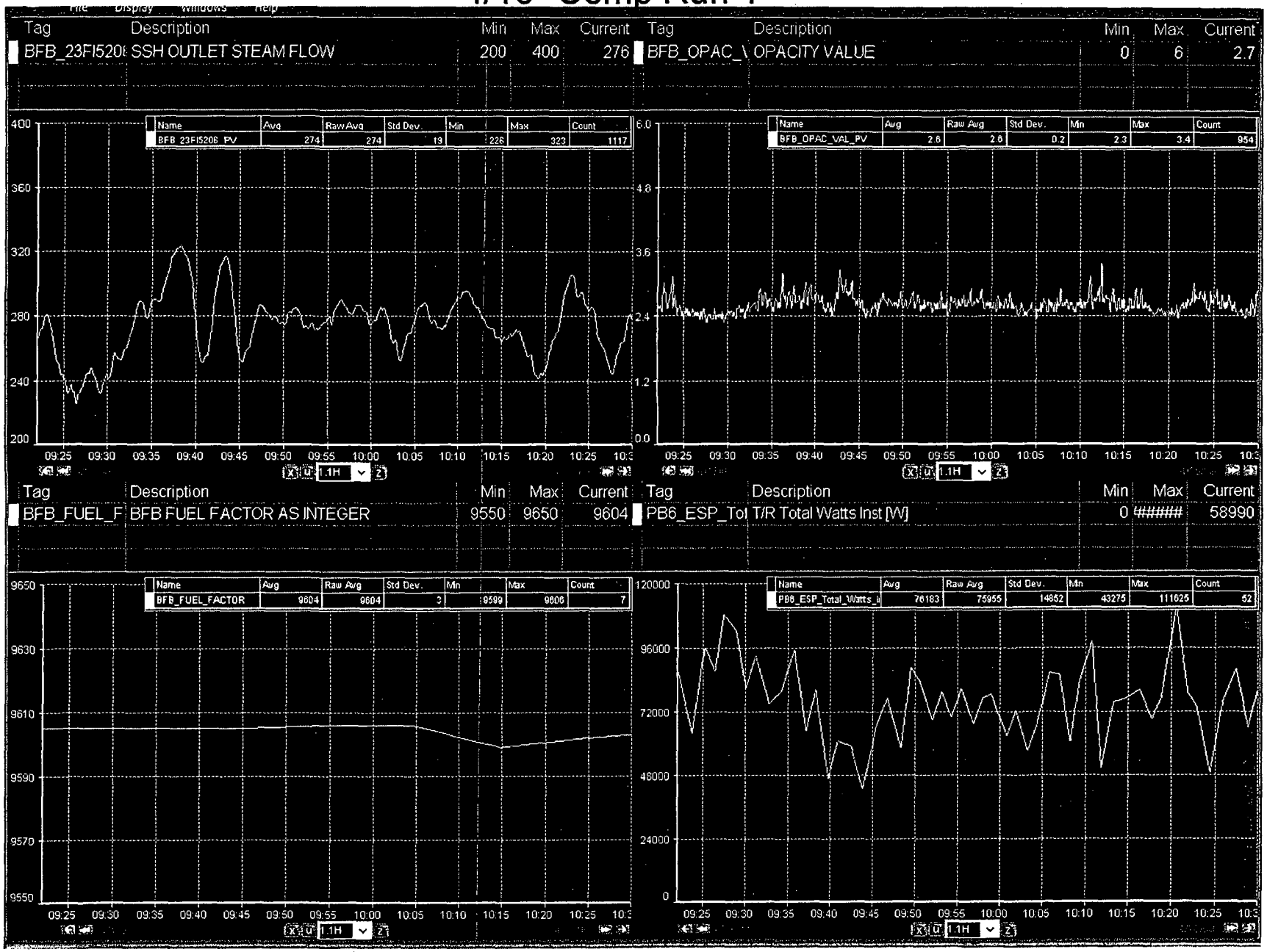
4/15 -Comp Run 2



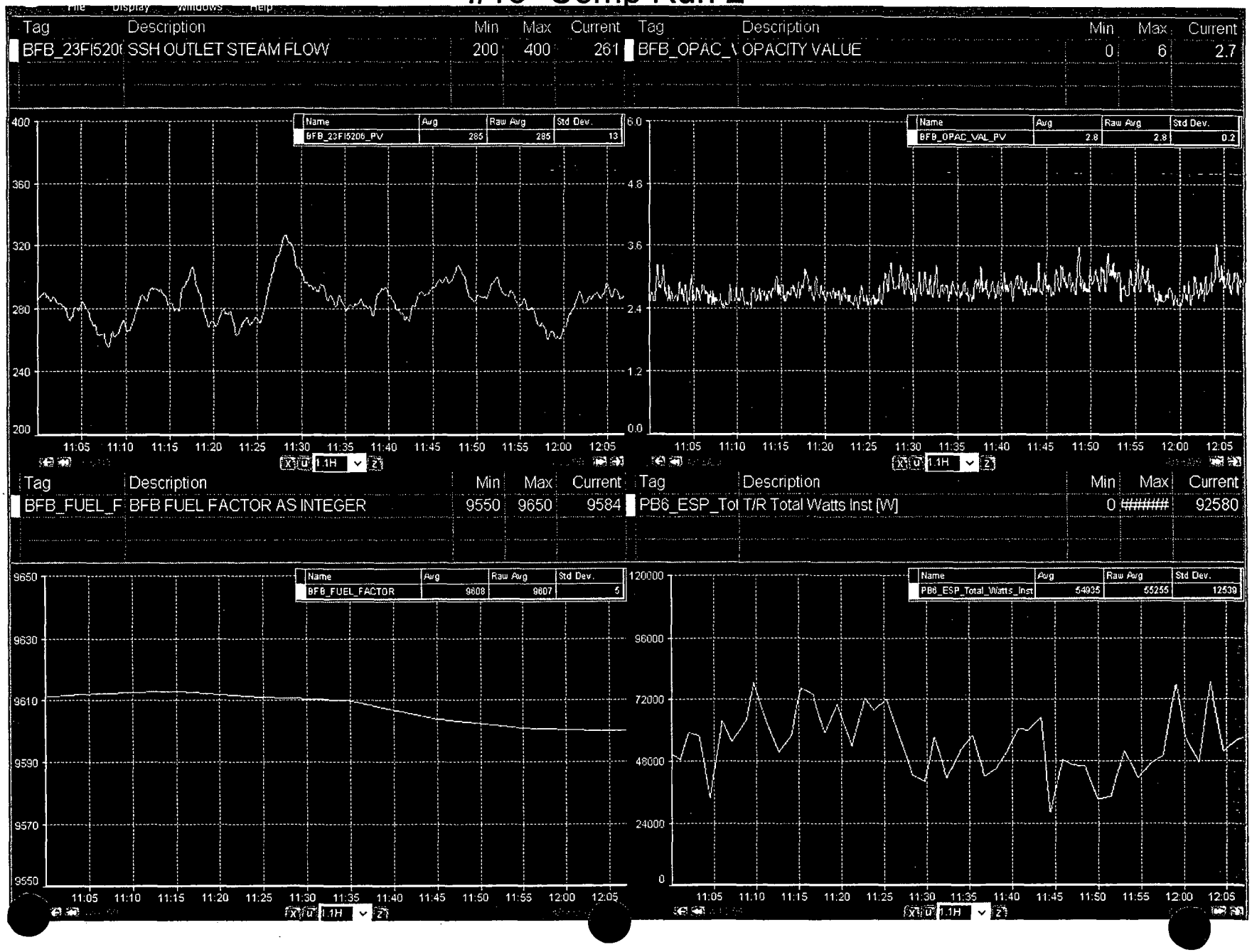
4/15 -Comp Run 3



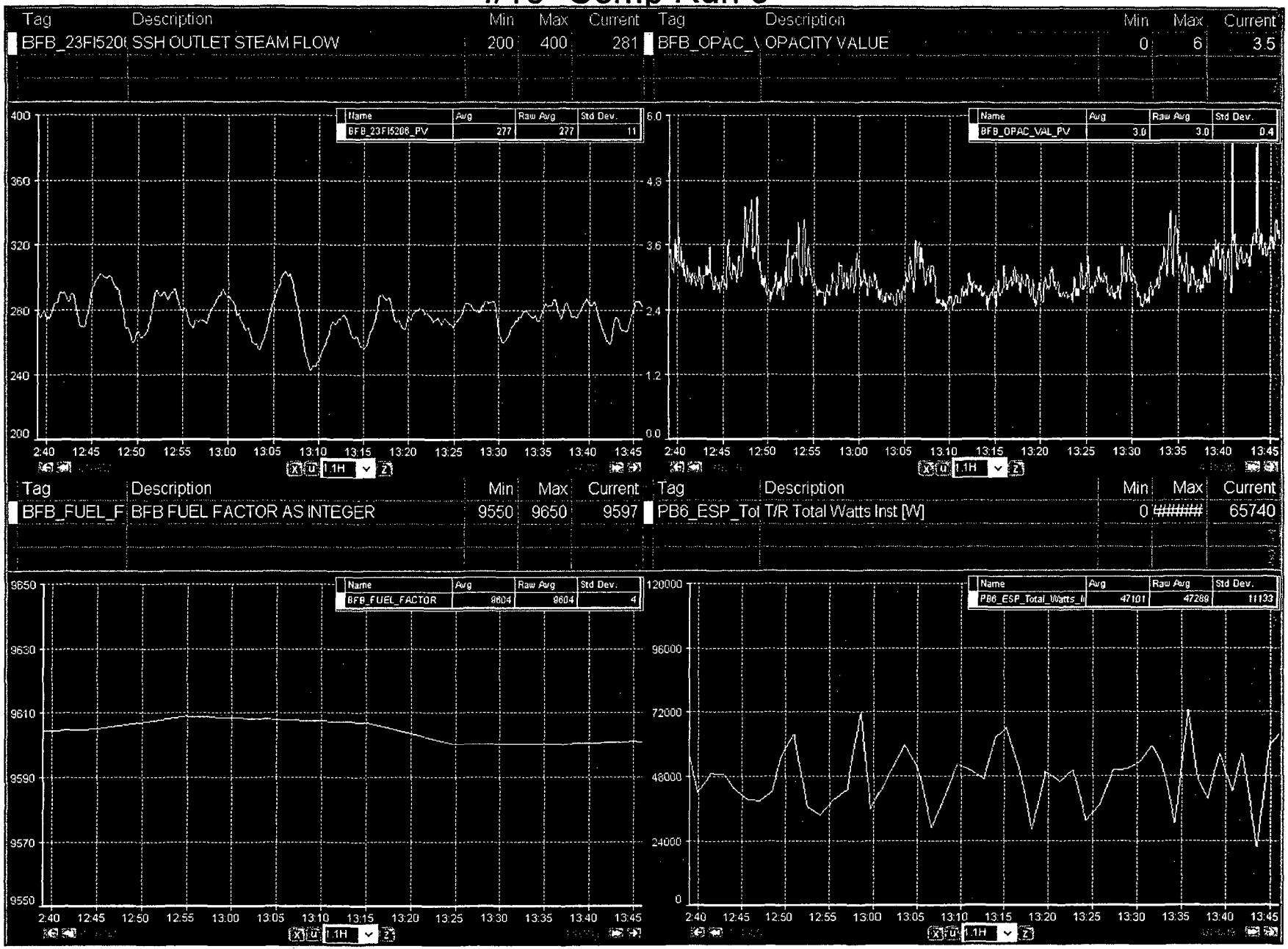
4/16 -Comp Run 1



4/16 -Comp Run 2



4/16 -Comp Run 3



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