SULFUR DIOXIDE AND NITROGEN OXIDES COMPLIANCE AND SULFUR DIOXIDE RELATIVE ACCURACY TEST AUDIT REPORT

FOR

HUNT REFINING
No. 2 Sulfur Plant
Tuscaloosa, Alabama

April 27 and 28, 2010

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ILLUSTRATIONS

1. INTRODUCTION

Sanders Engineering & Analytical Services, Inc. (SEAS) performed volumetric flow rate, oxygen, sulfur dioxide, and nitrogen oxides compliance emissions testing for Hunt Refining on the No. 2 Sulfur Plant located at the Tuscaloosa, Alabama facility. A sulfur dioxide relative accuracy test audit was performed on the Continuous Emissions Monitoring System (CEMS). The testing was conducted April 27 and 28, 2010. The testing was performed in accordance with the applicable U.S. EPA procedures specified at **40 CFR, Part 60, Appendix A**, **Methods 1, 2, 3a, 4, 6c, 7e and 40 CFR, Part 60, Appendix B, Performance Specification II**. Further discussions of the test methods are included later in the report.

The purpose of the testing was to demonstrate compliance with the rules and regulations of the U. S. Environmental Protection Agency, and to meet the necessary requirements contained in the permit to operate issued by the Alabama Department of Environmental Management. The tests were conducted by Mr. Eric Jones and Mr. Brett Horton of Sanders Engineering & Analytical Services, Inc., and were coordinated with Ms. Casey Frederick of Hunt Refining. Mr. David Oliver of the Alabama Department of Environmental Management was present to observe the testing.

2. DESCRIPTION OF SAMPLING PROGRAM

The sampling program consisted of volumetric flow rate, oxygen, nitrogen oxides, and sulfur dioxide emissions testing in compliance with US EPA methods. The following is a brief description of these types of tests.

2.1. Volumetric Flow Rate Testing

The quantitative determination of flow rate was made in accordance with **40 CFR, Part 60, Appendix A, Method 2**. This test procedure generally requires the insertion of a pitot tube into the stack at a series of points. The data from the pitot tube was recorded on the field data sheet. The diameter of the stack at the test ports was measured, the area calculated, and the product of area times velocity gave flow rate (cubic feet per minute or other denominations). Calibrations of the volumetric flow rate testing equipment are included in Appendix A. The completed field data sheets are presented in Appendix B. A detailed description of the testing procedures and schematic of the sampling train is presented in Section 6.

2.2. Oxygen, Nitrogen Oxides, and Sulfur Dioxide Testing

Oxygen, nitrogen oxides, and sulfur dioxide testing was accomplished by withdrawing a sample of the stack gas through a stainless steel probe, a moisture removal system, and into instruments specifically designed for the measurement of the particular pollutants of interest. These instruments responded linearly to concentrations of the pollutants. The output of these instruments is a continuous analog voltage which is digitized and input into a PC based data acquisition system. The PC data acquisition system polls the instruments 1000 times per second. The computer averages these readings into one-second averages during calibrations and one minute averages at other times. These one second and one minute averages are written to the hard disk each minute to ensure no data loss due to power failure or other inadvertent occurrence. The computer stores in memory all calibration and stack gas analyses during each run. The averages for each calibration and for each independent run were averaged for the time of the runs. A description of the testing procedures is included in Section 7. The gas certifications are included in Appendix C. The pollutant monitor concentrations as supplied by a representative of Hunt Refining are included in Appendix D. Sample calculations of Run 1 on are presented in Appendix E.

2.3. Relative Accuracy Test Audit

The sulfur dioxide relative accuracy was calculated from the simultaneous measurement of stack gas concentrations by the CEMS and SEAS reference monitors. The calculations and equations are those specified by the U. S. EPA at **40 CFR, Part 60, Appendix B**.

3. SUMMARY AND DISCUSSION OF RESULTS

After the completion of the testing on April 27, 2010, it was discovered the sulfur dioxide RATA did not meet the requirements of **40 CFR, Part 60, Appendix B, Performance Specification II**. The sulfur dioxide compliance and relative accuracy test audit was performed again on April 28, 2010. The results of the sulfur dioxide compliance and relative accuracy test audit performed on April 27, 2010 are included in Appendix F. There were no additional problems experienced during the performance of the testing.

The results of the nitrogen emissions testing performed on April 27, 2010 are presented in Table I. Graphical representations of the stack gas concentrations are presented in Figure 1. The nitrogen oxides testing quality assurance are presented in Table II. The results of the volumetric flow rate testing are presented in Table III.

The results of the oxygen and sulfur dioxide compliance testing performed on April 28, 2010 are presented in Table IV. The results of the sulfur dioxide compliance RATA emissions performed on April 28, 2010 are presented in Table V. Graphical representations of the stack gas concentrations are presented in Figure 2. The results of the sulfur dioxide relative accuracy test audit are presented in Table VI. The sulfur dioxide and oxygen testing quality assurance are presented in Tables VII and VIII.

TABLE I. NITROGEN OXIDES EMISSIONS TEST RESULTS
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

TEST	Start Time Military	Stop Time Military	Stack Gas Flow Rate (Standard Dry Cubic Feet per Minute)	Water Vapor in Stack Gas (Percent)	Nitrogen Oxides Emissions (ppm-dry)	Nitrogen Oxides Emissions (Lbs/hour)
RUN 1	7:14	8:17	3,618	6.0	4.9	0.13
RUN 2	8:30	9:33	3,487	6.7	5.3	0.13
RUN 3	9:45	10:48	3,407	6.9	5.6	0.14
Average			3,504	6.5	5.3	0.13
Allowable						0.8

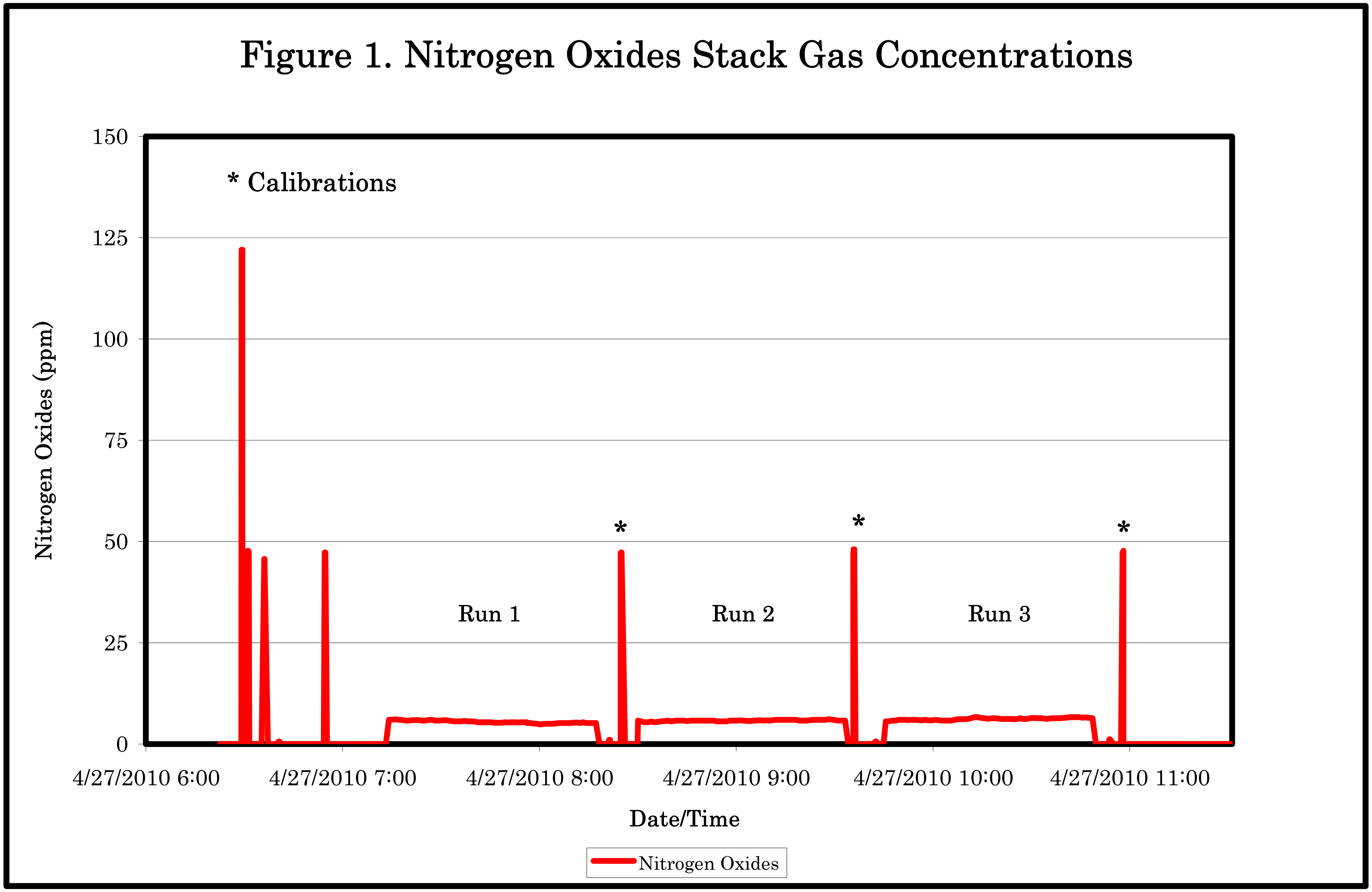


Figure 1. Nitrogen Oxides Stack Gas Concentrations
* Calibrations
Nitrogen Oxides (ppm)
150
125
100
75
50
25
0
*
*
*
Run 1
Run 2
Run 3
4/27/2010 6:00
4/27/2010 7:00
4/27/2010 8:00
4/27/2010 9:00
4/27/2010 10:00
4/27/2010 11:00
Date/Time
Nitrogen Oxides

TABLE II. NITROGEN OXIDES TESTING QUALITY ASSURANCE
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

Analyzer Calibration Data

INITIAL ANALYZER SPAN (PPM) =		122	ANALYZER ID.	NITROGEN OXIDES
	CYLINDER VALUE PPM	ANALYZER RESPONSE (PPM)	DIFFERENCE (PPM)	DIFFERENCE % SPAN (ALLOWED 2%)
Zero Gas	0.00	0.00	0.0	0.0
High Range Gas	122.00	122.00	0.0	0.0
Mid Range Gas	49.10	47.60	1.5	1.2
NO2 Converter Efficiency	46.63	45.70	Allowed >90%	98.0%

Test Results & Analyzer Calibration Bias and Drift Data

data & calculation entry						
START TIME OF RUN	STOP TIME OF RUN	RUN #	ANALYZER STACK GAS CONCENTRATION UNCORRECTED (PPM)	SYSTEM ZERO (PPM)	SYSTEM UPSCALE (PPM)	CYLINDER CONCENTRATION UPSCALE CALIBRATION GAS (PPM)
			INITIAL SYSTEM	0.60	47.30	
7:14	7:35	RUN 1	5.90	1.00	47.20	49.1
7:35	7:56	RUN 2	5.40	1.00	47.20	49.1
7:56	8:17	RUN 3	5.10	1.00	47.20	49.1
8:30	8:51	RUN 4	5.70	0.60	47.80	49.1
8:51	9:12	RUN 5	5.80	0.60	47.80	49.1
9:12	9:33	RUN 6	5.90	0.60	47.80	49.1
9:45	10:06	RUN 7	5.90	1.10	47.40	49.1
10:06	10:27	RUN 8	6.30	1.10	47.40	49.1
10:27	10:48	RUN 9	6.40	1.10	47.40	49.1

system zero bias & drift			system upscale bias & drift			test results	RUN #
INITIAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	ZERO DRIFT % SPAN (ALLOWED 3%)	INITIAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	UPSCALE DRIFT % SPAN (ALLOWED 3%)	NITROGEN DIOXIDE CONCENTRATION (PPM-Dry)	
0.49	0.82	0.33	-0.25	-0.33	-0.1	**5.4**	RUN 1
0.49	0.82	0.33	-0.25	-0.33	-0.1	**4.9**	RUN 2
0.49	0.82	0.33	-0.25	-0.33	-0.1	**4.5**	RUN 3
0.82	0.49	-0.33	-0.33	0.16	0.5	**5.2**	RUN 4
0.82	0.49	-0.33	-0.33	0.16	0.5	**5.3**	RUN 5
0.82	0.49	-0.33	-0.33	0.16	0.5	**5.4**	RUN 6
0.49	0.90	0.41	0.16	-0.16	-0.3	**5.3**	RUN 7
0.49	0.90	0.41	0.16	-0.16	-0.3	**5.7**	RUN 8
0.49	0.90	0.41	0.16	-0.16	-0.3	**5.8**	RUN 9

TABLE III. VOLUMETRIC FLOW RATE TEST RESULTS
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

Title of Run		RUN 1	RUN 2	RUN 3
Date	Month/Day/Year	4/27/2010	4/27/2010	4/27/2010
Sampling Time -Start	Military	0714	0830	0945
Sampling Time -Stop	Military	0814	0930	1045
Number of Ports	dimensionless	2	2	2
Number of Points per Port	dimensionless	6	6	6
Stack Static Pressure	Inches Water	-0.45	-0.45	-0.45
Barometric Pressure	Inches Mercury	29.80	29.80	29.80
Standard Orifice Pressure ΔH@	Inches Water	2.001	2.001	2.001
Meter Correction Factor	dimensionless	0.974	0.974	0.974
Oxygen Concentration	Mole Percent O2	5.72	5.70	5.67
Carbon Dioxide Concentration	Mole Percent CO2	0.5	0.5	0.5
Volume of Gas Metered	Actual Cubic Feet	40.805	40.600	40.920
Volume of Water Collected	Milliliters	54.4	60.2	61.7
Sampling Time	Minutes	60	60	60
Area of Stack	Square Feet	5.585	5.585	5.585
Avg. Sqr. Root Velocity Pressure	Inches Water	0.2773	0.2675	0.2635
Average Orifice Pressure (ΔH)	Inches Water	1.5	1.5	1.5
Average Stack Temperature	Degrees F	546	535	548
Average Meter Temperature	Degrees F	62	68	74

Calculations

		RUN 1	RUN 2	RUN 3	AVERAGE
Volume of Gas Sampled	Standard Dry Cubic Feet	40.182	39.507	39.426	39.705
Molecular Wt. of Stack Gas (dry)	LB/LB-MOLE	28.31	28.31	28.31	28.31
Water vapor in Stack Gas	Percent	6.0	6.7	6.9	6.5 0
Average Stack Gas Velocity	Feet per second	22.0	21.1	21.0	21.4
Stack Gas Flow Rate	Actual Cubic Feet Per Minute	7,369	7,080	7,024	7,158
Stack Gas Flow Rate	Standard Wet Cubic Feet Per Minute	3,848	3,737	3,658	3,748
Stack Gas Flow Rate	Standard Dry Cubic Feet Per Minute	3,618	3,487	3,407	3,504
Post Test Meter Correction Check	dimensionless	0.96	0.97	0.97	0.97
Percent Difference	Allowed 5% Average	-1.2	-0.2	-0.5	-0.6

TABLE IV. SULFUR DIOXIDE COMPLIANCE EMISSIONS TEST RESULTS
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Wednesday, April 28, 2010

TEST	Start Time Military	Stop Time Military	Oxygen (Dry) (measured) (Percent)	Sulfur Dioxide Emissions (ppm-dry)	Sulfur Dioxide Concentration Corrected to 0.0% O2 (ppm-dry)
RUN 1	9:58	11:02	7.4	55.0	84.9
RUN 2	11:13	12:16	7.1	53.0	80.4
RUN 3	12:26	13:51	7.0	49.4	74.1
Average			7.2	52.5	79.8
Allowable					250

TABLE V. SULFUR DIOXIDE RATA EMISSIONS TEST RESULTS
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Wednesday, April 28, 2010

TEST	Start Time Military	Stop Time Military	Oxygen (Dry) (measured) (Percent)	Sulfur Dioxide Emissions (ppm-dry)	Sulfur Dioxide Concentration Corrected to 0.0% O2 (ppm-dry)
RUN 1	9:58	10:19	7.4	50.9	78.7
RUN 2	10:19	10:40	7.3	55.4	85.0
RUN 3	10:41	11:02	7.4	58.8	90.9
RUN 4	11:13	11:34	7.0	52.2	78.6
RUN 5	11:34	11:55	7.2	54.3	82.8
RUN 6	11:55	12:16	7.2	52.4	79.9
RUN 7	12:26	12:47	7.0	57.8	87.1
RUN 8	13:09	13:30	6.8	45.9	68.2
RUN 9	13:30	13:51	7.0	44.5	67.1
Average			7.2	52.5	79.8

TABLE VI. SULFUR DIOXIDE RELATIVE ACCURACY TEST AUDIT
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Wednesday, April 28, 2010

USE	RUN	START TIME Military	STOP TIME Military	*Reference Method* Sulfur Dioxide Concentration Corrected to 0% O2 (ppm-dry)	*Pollutant Monitor* Sulfur Dioxide Concentration Corrected to 0% O2 (ppm-dry)	Difference
Y	RUN 1	9:58	10:19	78.7	64.1	14.6
Y	RUN 2	10:19	10:40	85.0	67.5	17.5
Y	RUN 3	10:41	11:02	90.9	72.6	18.3
Y	RUN 4	11:13	11:34	78.6	66.0	12.6
Y	RUN 5	11:34	11:55	82.8	72.9	9.9
Y	RUN 6	11:55	12:16	79.9	69.5	10.4
Y	RUN 7	12:26	12:47	87.1	58.9	28.2
Y	RUN 8	13:09	13:30	68.2	53.8	14.4
Y	RUN 9	13:30	13:51	67.1	49.9	17.2

STD = Emission Standard = 250

$$\text{Average Difference} = \bar{d} = \frac{1}{N}\sum_{i=1}^{N} d_i = \quad 15.895$$

$$\text{Reference Method Average} = \overline{\text{RM}} = \frac{1}{N}\sum_{i=1}^{N} RM_i = \quad 79.803$$

$$\text{Pollutant Monitor Average} = \text{PR}_{\text{ave}} = \frac{1}{N}\sum_{i=1}^{N} \text{PR}_i = \quad 63.908$$

$$\text{Standard Deviation} = S_d = \sqrt{\frac{1}{N-1}\left\{\sum_{i=1}^{n} d_i^{\,2} - n\bar{d}^{\,2}\right\}} = \quad 5.510$$

$$\text{Confidence Coefficient} = |cc| = t_{0.975}\frac{S_d}{\sqrt{N}} = \quad 4.236$$

$$\text{Relative Accuracy} = \frac{|\bar{d}| + |cc|}{\text{STD.}} \times 100 = \quad 8.052$$

Allowable = 10.000

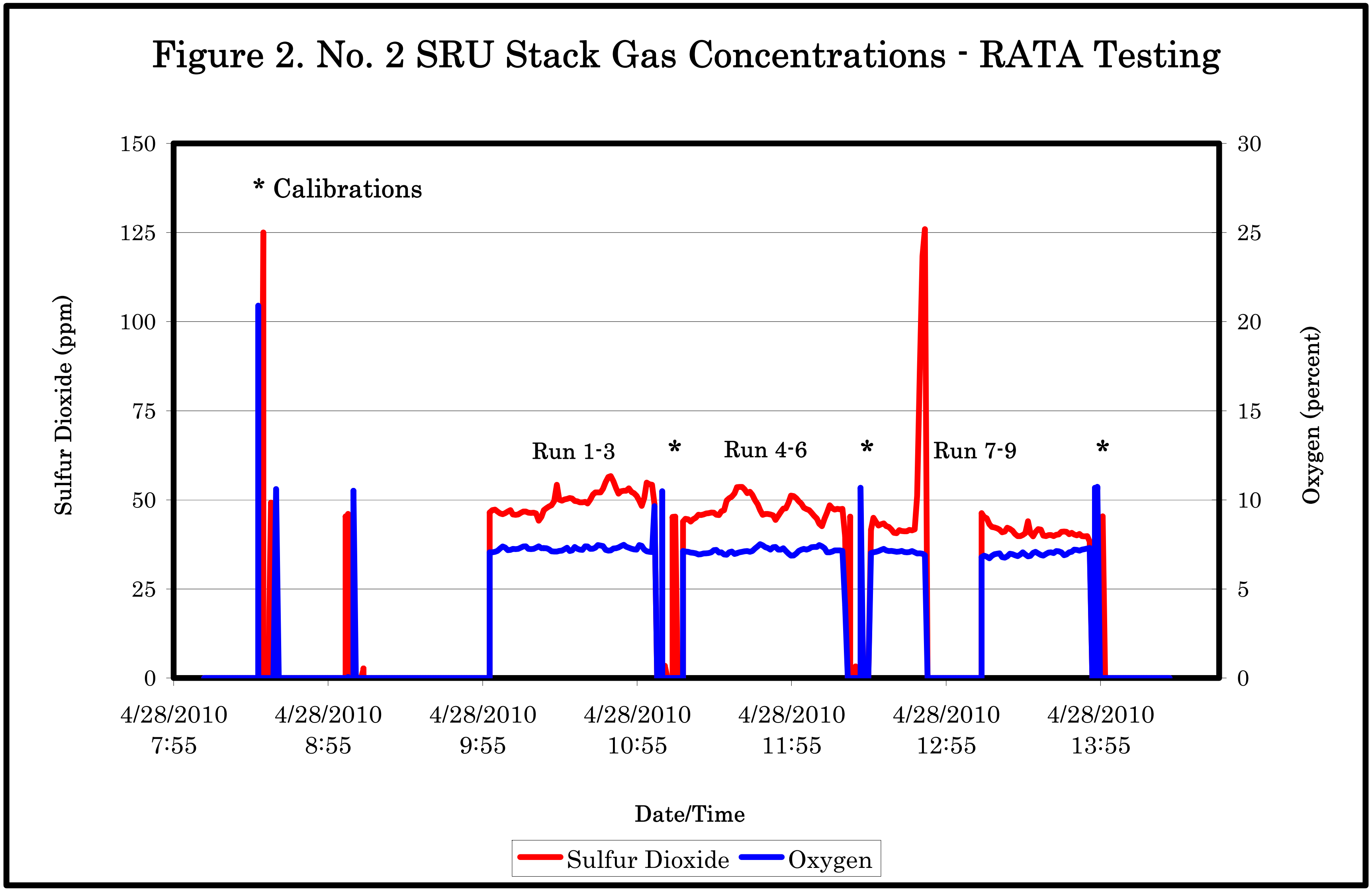


Figure 2. No. 2 SRU Stack Gas Concentrations - RATA Testing
* Calibrations
Run 1-3
*
Run 4-6
*
Run 7-9
*
Sulfur Dioxide (ppm)
150
125
100
75
50
25
0
Oxygen (percent)
30
25
20
15
10
5
0
4/28/2010 7:55
4/28/2010 8:55
4/28/2010 9:55
4/28/2010 10:55
4/28/2010 11:55
4/28/2010 12:55
4/28/2010 13:55
Date/Time
Sulfur Dioxide
Oxygen

TABLE VII. OXYGEN TESTING QUALITY ASSURANCE
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Wednesday, April 28, 2010

Analyzer Calibration Data

INITIAL ANALYZER SPAN (Percent) =		21	ANALYZER ID.	OXYGEN
	CYLINDER VALUE Percent	ANALYZER RESPONSE (Percent)	DIFFERENCE (Percent)	DIFFERENCE % SPAN (ALLOWED 2%)
Zero Gas	0.00	0.00	0.0	0.0
High Range Gas	20.90	20.90	0.0	0.0
Mid Range Gas	10.60	10.60	0.0	0.0

Test Results & Analyzer Calibration Bias and Drift Data

data & calculation entry						
START TIME OF RUN	STOP TIME OF RUN	RUN #	ANALYZER STACK GAS CONCENTRATION UNCORRECTED (Percent)	SYSTEM ZERO (Percent)	SYSTEM UPSCALE (Percent)	CYLINDER CONCENTRATION UPSCALE CALIBRATION GAS (Percent)
			INITIAL SYSTEM	-0.10	10.50	
9:58	10:19	RUN 1	7.30	0.00	10.50	10.6
10:19	10:40	RUN 2	7.20	0.00	10.50	10.6
10:41	11:02	RUN 3	7.30	0.00	10.50	10.6
11:13	11:34	RUN 4	7.00	0.00	10.70	10.6
11:34	11:55	RUN 5	7.20	0.00	10.70	10.6
11:55	12:16	RUN 6	7.20	0.00	10.70	10.6
12:26	12:47	RUN 7	7.10	0.00	10.70	10.6
13:09	13:30	RUN 8	6.90	0.00	10.70	10.6
13:30	13:51	RUN 9	7.10	0.00	10.70	10.6

system zero bias & drift			system upscale bias & drift			test results	RUN #
INITIAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	ZERO DRIFT % SPAN (ALLOWED 3%)	INITIAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	UPSCALE DRIFT % SPAN (ALLOWED 3%)	OXYGEN CONCENTRATION (Percent-Dry)	
-0.48	0.00	0.48	-0.48	-0.48	0.0	**7.4**	RUN 1
-0.48	0.00	0.48	-0.48	-0.48	0.0	**7.3**	RUN 2
-0.48	0.00	0.48	-0.48	-0.48	0.0	**7.4**	RUN 3
0.00	0.00	0.00	-0.48	0.48	1.0	**7.0**	RUN 4
0.00	0.00	0.00	-0.48	0.48	1.0	**7.2**	RUN 5
0.00	0.00	0.00	-0.48	0.48	1.0	**7.2**	RUN 6
0.00	0.00	0.00	0.48	0.48	0.0	**7.0**	RUN 7
0.00	0.00	0.00	0.48	0.48	0.0	**6.8**	RUN 8
0.00	0.00	0.00	0.48	0.48	0.0	**7.0**	RUN 9

TABLE VIII. SULFUR DIOXIDE TESTING QUALITY ASSURANCE
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Wednesday, April 28, 2010

Analyzer Calibration Data

INITIAL ANALYZER SPAN (PPM) =	125	ANALYZER ID.	SULFUR DIOXIDE	
	CYLINDER VALUE PPM	ANALYZER RESPONSE (PPM)	DIFFERENCE (PPM)	DIFFERENCE % SPAN (ALLOWED 2%)
Zero Gas	0.00	0.00	0.0	0.0
High Range Gas	125.00	125.00	0.0	0.0
Mid Range Gas	50.03	49.00	1.0	0.8

Test Results & Analyzer Calibration Bias and Drift Data

data & calculation entry

START TIME OF RUN	STOP TIME OF RUN	RUN #	ANALYZER STACK GAS CONCENTRATION UNCORRECTED (PPM)	SYSTEM ZERO (PPM)	SYSTEM UPSCALE (PPM)	CYLINDER CONCENTRATION UPSCALE CALIBRATION GAS (PPM)
			INITIAL SYSTEM	2.50	46.00	
9:58	10:19	RUN 1	46.30	3.50	45.10	50.03
10:19	10:40	RUN 2	50.10	3.50	45.10	50.03
10:41	11:02	RUN 3	53.00	3.50	45.10	50.03
11:13	11:34	RUN 4	47.00	3.10	45.20	50.03
11:34	11:55	RUN 5	48.70	3.10	45.20	50.03
11:55	12:16	RUN 6	47.10	3.10	45.20	50.03
12:26	12:47	RUN 7	51.80	1.30	45.10	50.03
13:09	13:30	RUN 8	41.60	1.30	45.10	50.03
13:30	13:51	RUN 9	40.40	1.30	45.10	50.03

system zero bias & drift			system upscale bias & drift			test results	RUN #
INITIAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	ZERO DRIFT % SPAN (ALLOWED 3%)	INITIAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	UPSCALE DRIFT % SPAN (ALLOWED 3%)	SULFUR DIOXIDE CONCENTRATION (PPM-Dry)	
2.00	2.80	0.80	-2.40	-3.12	-0.7	**50.9**	RUN 1
2.00	2.80	0.80	-2.40	-3.12	-0.7	**55.4**	RUN 2
2.00	2.80	0.80	-2.40	-3.12	-0.7	**58.8**	RUN 3
2.80	2.48	-0.32	-3.12	-3.04	0.1	**52.2**	RUN 4
2.80	2.48	-0.32	-3.12	-3.04	0.1	**54.3**	RUN 5
2.80	2.48	-0.32	-3.12	-3.04	0.1	**52.4**	RUN 6
2.48	1.04	-1.44	-3.04	-3.12	-0.1	**57.8**	RUN 7
2.48	1.04	-1.44	-3.04	-3.12	-0.1	**45.9**	RUN 8
2.48	1.04	-1.44	-3.04	-3.12	-0.1	**44.5**	RUN 9

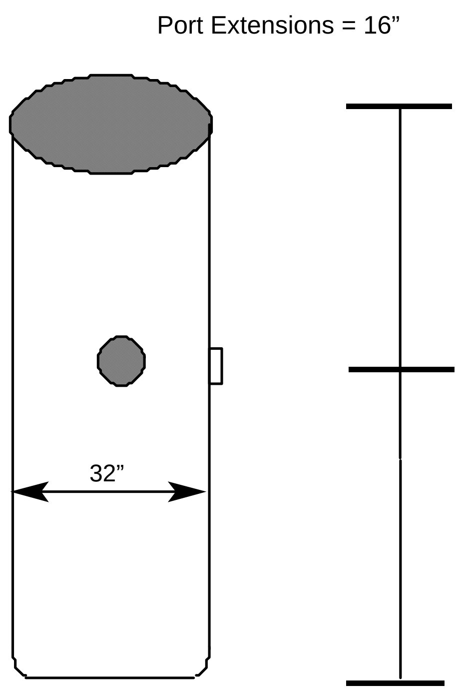
4. PROCESS DESCRIPTION

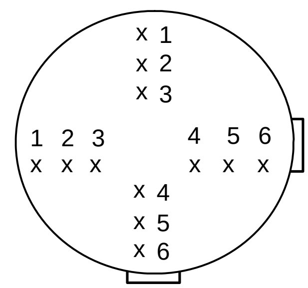
The process consists of a crude oil refinery. Hydrogen sulfide is removed from various locations in the refining process. The hydrogen sulfide is fed to the three-stage modified Claus plant where a portion of the sulfur is oxidized to sulfur dioxide. The products of the combustion are passed through the Claus process for the conversion of sulfur to elemental sulfur, which is stored as a liquid in the sulfur pit. The gases from the Claus plant are fed to a Scot Tail Gas Unit for absorption of the remaining sulfur dioxide and hydrogen sulfide gases which are recycled back to the beginning of the Claus Plant. The remaining gases are fed to an incinerator for complete oxidation of any uncollected hydrogen sulfide to sulfur dioxide before discharge into the atmosphere. The test ports were located in the stack.

5. SAMPLE POINT LOCATION

The sample point locations and outlet duct schematic for Hunt Refining, No. 2 Sulfur Recovery Unit, are presented in Figure 3.

Figure 3. Sample Point Locations





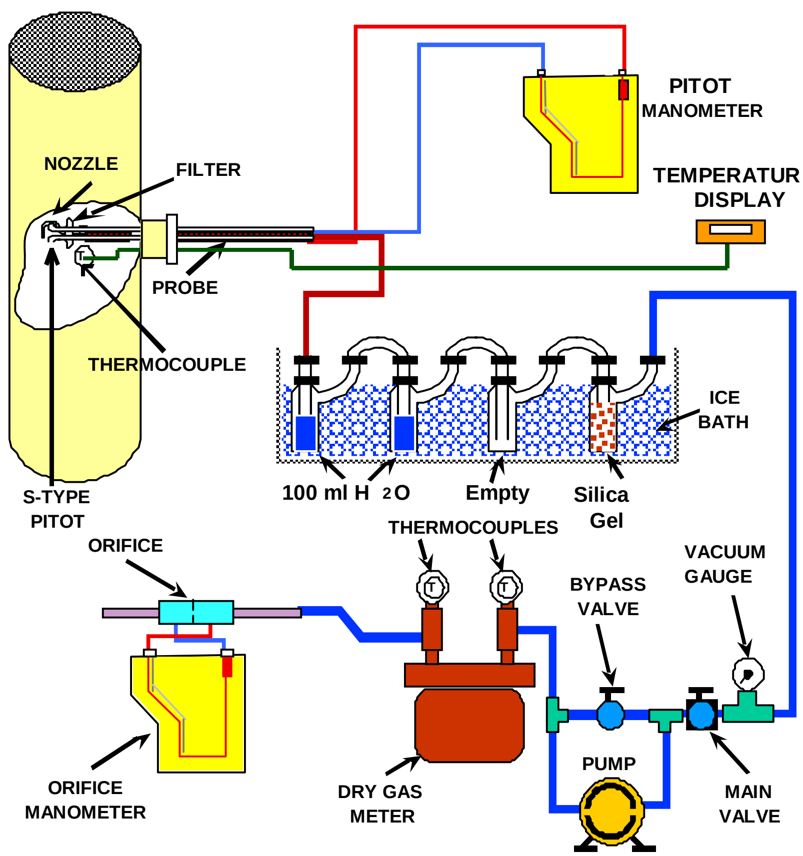
Point Number	Distance From Stack Wall (Inches)
1	30.59
2	27.33
3	22.53
4	9.38
5	4.67
6	1.41

Stack Area = 5.585 $ft.^2$

6. VELOCITY SAMPLING PROCEDURE (EPA Methods 1, 2, 3, and 4)

The sampling procedure utilized is that specified in **40 CFR, Part 60, Appendix A, Methods 1, 2, 3, and 4**. A brief description of this procedure is as follows:

Figure 4. Velocity Sampling Train



The first two impingers were partially filled with 100 milliliters of deionized water. The next impinger was left empty to act as a moisture trap. Preweighed 6 to 16 mesh indication silica gel was added to the last impinger. The sampling equipment manufactured by Lear Siegler (Model 100) or Sanders Engineering (Model 200) was assembled as shown in the attached drawing. The system was leak checked by plugging the inlet to the nozzle and pulling a 15 inch mercury vacuum. A leakage rate not in excess of 0.02 cubic feet per minute was considered acceptable.

The inside dimensions of the stack liner were measured and recorded. The required number of measurement points was marked on the probe for easy visibility. Crushed ice was placed around the impingers. The S-type pitot was placed on the first traverse point with the tip pointing directly into the gas stream.

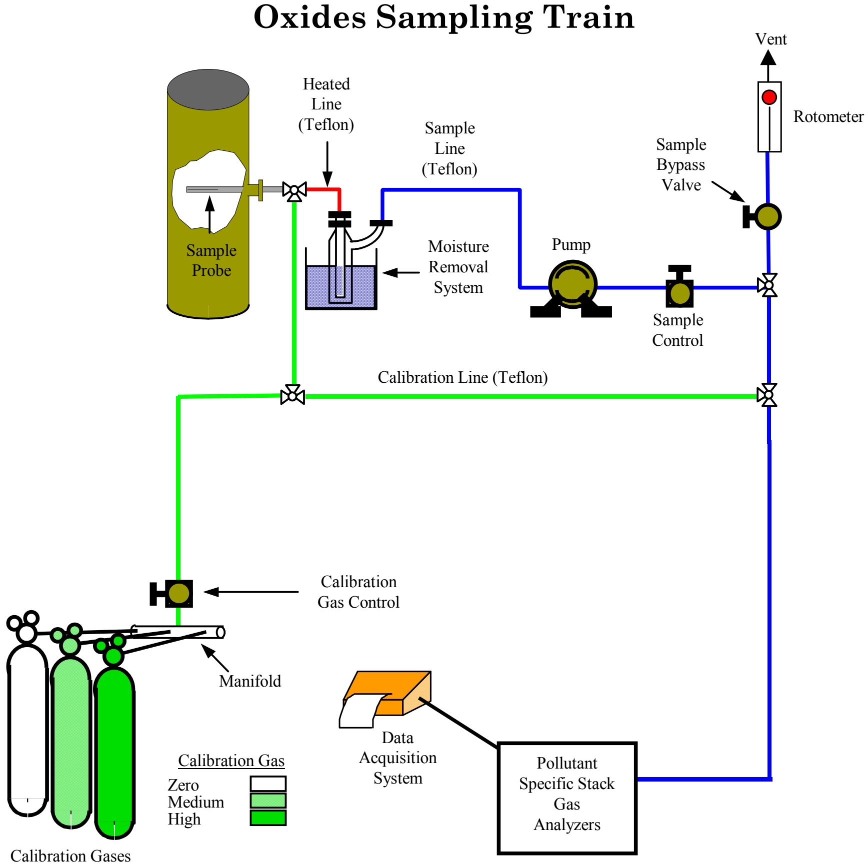
The pump was started and the flow was adjusted to approximately 0.75 cubic feet per minute sampling rate or a delta H of 1.5 inches of water. The probe was repositioned to the next traverse point for measurement of velocity pressure and stack temperature. This was performed for each point until the run was completed. Readings were taken at each point and recorded on the field data sheet. At the conclusion of each run, the pump was turned off, final readings were recorded, and final system leak checks were performed.

Care was exercised in moving the collection train to the sample recovery area to minimize the loss of collected sample, or the gain of extraneous water. The volume of water in the impingers was measured, the silica gel impinger was weighed, and these data recorded on the field data sheet. The S-type pitot tube was inspected to ensure that it continued to meet the geometric specifications of construction necessary to maintain its calibration.

7. OXYGEN, SULFUR DIOXIDE, AND NITROGEN OXIDES SAMPLING PROCEDURE (EPA Methods 3a, 6c, and 7e)

The sampling procedures utilized are those specified in **40 CFR, Part 60, Appendix A, Methods 3a, 6c, and 7e** as modified by the governing regulatory agency. A brief description of these procedures is as follows:

Figure 5. Oxygen, Sulfur Dioxide, and Nitrogen Oxides Sampling Train



The sample was removed from the stack through a stainless steel probe and passed through a three-way valve and condenser moisture removal system. Teflon® line was used to transport the sample through a transport pump and a flow control valve. From this point the sample was routed into a manifold with a bypass valve, an analyzer sample flow control valve, and to an analyzer specific for the pollutant of interest. Each analyzer produces a voltage analogue output proportional to the concentration of pollutant present in the gas. A schematic of the sampling train is presented in the attached drawing.

Each instrument was allowed to warm up for at least 30 minutes before it was initially calibrated. Zero air was introduced directly to each instrument to establish a baseline and check the zero reading of the instrument. A high range calibration gas was introduced directly to each instrument. The instrument was allowed to fully respond to the calibration gas. Each analyzer was adjusted, if needed, to the correct value. A linear calibration curve was calculated from this data and stored on computer. Next, a mid-range calibration gas was introduced directly to each instrument. The percent error between each measured value and the corresponding calibration value was calculated. If any of the readings indicated a difference of more than ±2 percent of the span the analyzer was recalibrated.

The high or mid gas and zero gas were then introduced to the system at the three-way valve before the condenser. The response value for each of these gases was recorded. If these measured values differed significantly from the calibration values the sampling system was checked and repaired until the system check met EPA specifications.

To begin sampling, the three-way valve was switched to allow the instrument to sample the stack gas. Twice the system response time was allowed to elapse before the data recorder was marked for the beginning of the run. After the required sampling time, the data recorder was marked for the end of the run. At the end of each run the three-way valve was switched to allow introduction of the zero and calibration gas to the system. From these data the calibration bias and drift were calculated. If the bias values were greater than ±5 percent of the span, or the drift was greater than three percent of the span, the run was invalidated. To begin the next run the three-way valve was switched to allow sampling of the stack gas and the next run was started. This procedure was repeated until all runs were complete.

7.1. Sample Recovery & Analysis

After the tests were completed the data was reduced to give an average concentration in parts per million for each run. This average concentration was then corrected for the analyzer zero and span bias and drift using the equation:

$$C\ gas = \frac{(C - Co)\ \ Cma}{(Cm - Co)}$$

Where:

C gas = Effluent gas Concentration, dry basis, ppm.

C = Average gas concentration indicated by the gas analyzer, dry basis, ppm.

Co = Average of Initial and final system calibration responses for the zero gas, ppm.

Cm = Average of initial and final calibration responses for the upscale calibration gas, ppm.

Cma = Actual concentration of the scale calibration gas, ppm.

8. QUALITY ASSURANCE

In order to ensure the accuracy of all the data collected in the field and at the laboratory, SEAS has instituted a comprehensive quality assurance and quality control program. New or repaired items requiring calibration are calibrated before their initial use in the field. Equipment with calibration that may change with use is calibrated before and after each use. When an item is found to be out of calibration the unit is either discarded or repaired and recalibrated before being returned to service. All equipment is periodically recalibrated in full regardless of the results of the regular inspections or its present calibration status. Calibrations are performed in a manner consistent with the EPA reference methods recommended in the "Quality Assurance Handbook for Air Pollution Measurement Systems" published by the US Environmental Protection Agency. To the maximum degree possible all calibrations are traceable to the National Institute of Standards & Technology (NIST). SEAS is a LELAP certified laboratory.

In order to ensure that the testing will be performed in a timely manner without undue delays, SEAS sampling vans are equipped with duplicate sampling devices for almost every device needed to perform the test. If a particular device is broken or does not pass inspection a second device is available immediately at the site for use. Any device which appears to be outside calibration, or is in need of repair, is tagged in the field and repaired, calibrated, or discarded immediately upon return to the laboratory.

8.1. Calibrations

Certain pieces of equipment need to be calibrated before and after each test. Those items include pitot tubes, differential pressure gauges, dry gas meter, and nozzles used for the particulate testing. The following is a brief description of the calibration procedures for each of these important devices.

8.1.1. Pitot Tubes

All pitot tubes are the S-type as required by EPA Reference Method 2 (**40 CFR, Part 60, Appendix A, Method 2**). This method contains certain geometric standards for the construction of S-type pitot tubes. All of SEAS pitot tubes are constructed according to these standards. According to the EPA, any pitot tube constructed to these standards will have a coefficient of 0.84 $\pm$ 0.02. To ensure the exact value of SEAS pitot tubes all pitot tubes are initially calibrated in SEAS wind tunnel to determine the exact pitot coefficient. This coefficient should not change unless the pitot is physically damaged. Each pitot tube is checked before going to the field to make sure it meets the geometry as specified. Any pitot tube that fails to meet the specifications is not used in the test.

8.1.2. Differential Pressure Gauges

SEAS uses several different types of pressure gauges, including oil tube manometers, water tube manometers, magnehelics, and current output electronic load cells. Each of these devices are inspected before taken to the field and are inspected for leaks during each test. The magnehelics and load cells are tested against an incline manometer water gauge to ensure accuracy.

8.1.3. Orifice

The flow meter orifice is used to establish isokinetic sampling rates during the test. The orifice is calibrated with the dry gas meter at the same time under the same conditions. The orifice is calibrated over a wide range of flow rates and the arithmetic mean of the orifice calibration is used for sampling purposes. The orifice is recalibrated every time the gas meter is re-certified.

8.1.4. Dry Gas Meter

The dry gas meter is calibrated every six months against a spirometer transfer standard. It is again calibrated before and after each use in the field. During the semiannual calibration, a five-point calibration is made at a minimum of one-half inch water column orifice pressure and up to four inches water column orifice pressure. Before and after each test, the dry gas meter is again recalibrated at three repetitions at a representative flow rate experienced during the test. If the final calibration does not agree with the initial calibration within five percent, the calibration which yields the lowest volume of sample pulled is used in the calculations and the dry gas meter is repaired and recalibrated.

8.1.5. Temperature Sensors

All temperature sensors used in SEAS sampling program are either mercury in-glass thermometers or type K thermocouples. These thermocouples are physical devices which produce a voltage proportional to the temperature. The thermocouple reading device is calibrated before and after each series of tests to ensure accuracy of $\pm$ 2 percent. The calibration of the thermocouple is accomplished by a NIST traceable calibrated reference thermocouple potentiometer system.

8.1.6. Nozzles

The inside diameter of each nozzle is measured to the nearest 0.001 inches prior to its initial use. Upon arriving in the field each nozzle is again measured with a micrometer on three different points on the diameter to ensure its original measurement and that the nozzle is perfectly round. If the difference between the maximum and minimum diameters measured does not exceed 0.003 inches the nozzle is acceptable; otherwise, this nozzle is discarded and another is selected. At the end of each test the nozzles are again remeasured on three different points on the diameter to ensure that during the test the nozzle has not become dented or deformed.

APPENDIX A QUALITY CONTROL OF VOLUMETRIC FLOW RATE TESTING EQUIPMENT

INITIAL METER BOX CALIBRATION

Calibrated By: JEJ **BOX #:** S-102 **Date:** 9/22/2008

			Orifice #:	1	Orifice #:	3	Orifice #:	8
		Unit	**RUN 1**	**RUN 2**	**RUN 1**	**RUN 2**	**RUN 1**	**RUN 2**
Meter	**DH**	In. H_2O	0.73	0.73	1.20	1.20	1.70	1.70
Initial **Gas Volume**		Ft.^{3}	768.200	799.500	754.900	761.400	743.500	748.800
Final **Gas Volume**		Ft.^{3}	799.200	805.300	761.200	767.700	748.600	753.900
Initial **Temp. Out**		°F	75	74	75	75	74	75
Final **Temp. Out**		°F	74	75	75	75	75	75
	Vacuum	In. Hg	20.0	20.0	18.0	18.0	17.0	17.0
	Ambient **Temp.**	°F	74	72	73	75	72	73
Barometric Pressure		In. Hg	30.15	30.15	30.15	30.15	30.15	30.15
	Time	sec	4003	747	634	634	427	428
	K'		0.3499	0.3499	0.4443	0.4443	0.5237	0.5237
CALCULATIONS								
Total Meter Gas Volume		Actual Ft.^{3}	31.000	5.800	6.300	6.300	5.100	5.100
	Time	Minutes	66.717	12.450	10.567	10.567	7.117	7.133
Volume through the Meter		*SDCF without Y*	30.901	5.781	6.281	6.281	5.096	5.091
Volume through the Orifice		*SDCF*	30.458	5.694	6.131	6.120	4.872	4.879
Calculated Y		*Dimensionless*	**0.986**	**0.985**	**0.976**	**0.974**	**0.956**	**0.958**
	Difference	*Allowable 0.02*	0.012	0.011	0.002	0.001	-0.018	-0.015
Calculated DH@			**1.968**	**1.961**	**2.006**	**2.013**	**2.048**	**2.050**
	Difference	*Allowable 0.2*	-0.033	-0.040	0.005	0.012	0.047	0.049

Reference	**33103**	**Unit**	**RUN 4**	**RUN 5**	
Field Meter	**DH**	In. H_2O	3.40	3.28	
Initial **Gas Volume**		Ft.^{3}	807.000	813.800	
Final **Gas Volume**		Ft.^{3}	813.215	819.200	
Initial **Temp. Out**		°F	75	75	
Final **Temp. Out**		°F	75	75	
Reference Meter	**Y**	*Dimensionless*	0.952	0.952	
Initial **Gas Volume**		Ft.^{3}	467.650	474.370	
Final **Gas Volume**		Ft.^{3}	473.793	479.670	
Initial **Temp.**		°F	75	75	
Final **Temp.**		°F	75	75	
Barometric Pressure		In. Hg	30.15	30.150	
Time		sec	366	330	
Volume Field Meter		ACF	6.22	5.400	
Volume Field Meter		SDCF	6.230	5.411	
Volume Reference Meter		ACF	6.14	5.300	
Volume Reference Meter		SDCF	6.107	5.269	
Calculated Y			0.980	0.974	**0.974**
Difference			0.007	0.000	
Calculated DH@			1.929	2.032	**2.001**
Difference			-0.072	0.031	

Magnehelic Calibrations

Device	**Calibration**	**Delta P**	
	Standard	Magnehelic	
Units	inches water	inches water	*Percent*
Reading	Reference	Sample	*Error*
1	1.79	1.85	*3.4*
2	0.92	0.96	*4.3*
3	0.44	0.46	*4.5*

Allowed Error = 5% of Reading

Thermocouple Calibrations

Device	**Calibration**	**Thermocouple**	
	Standard	Detector	
Units	Degrees F.	Degrees F.	*Percent*
Reading	Reference	Sample	*Error*
1	750	758	*0.7*
2	400	405	*0.6*
3	100	103	*0.5*

Allowed Error = 1.5% of Absolute Temperature (Degrees Rankin);

Absolute Temperature = Temperature in Degrees Fahrenheit. + 460

Magnehelic Calibration

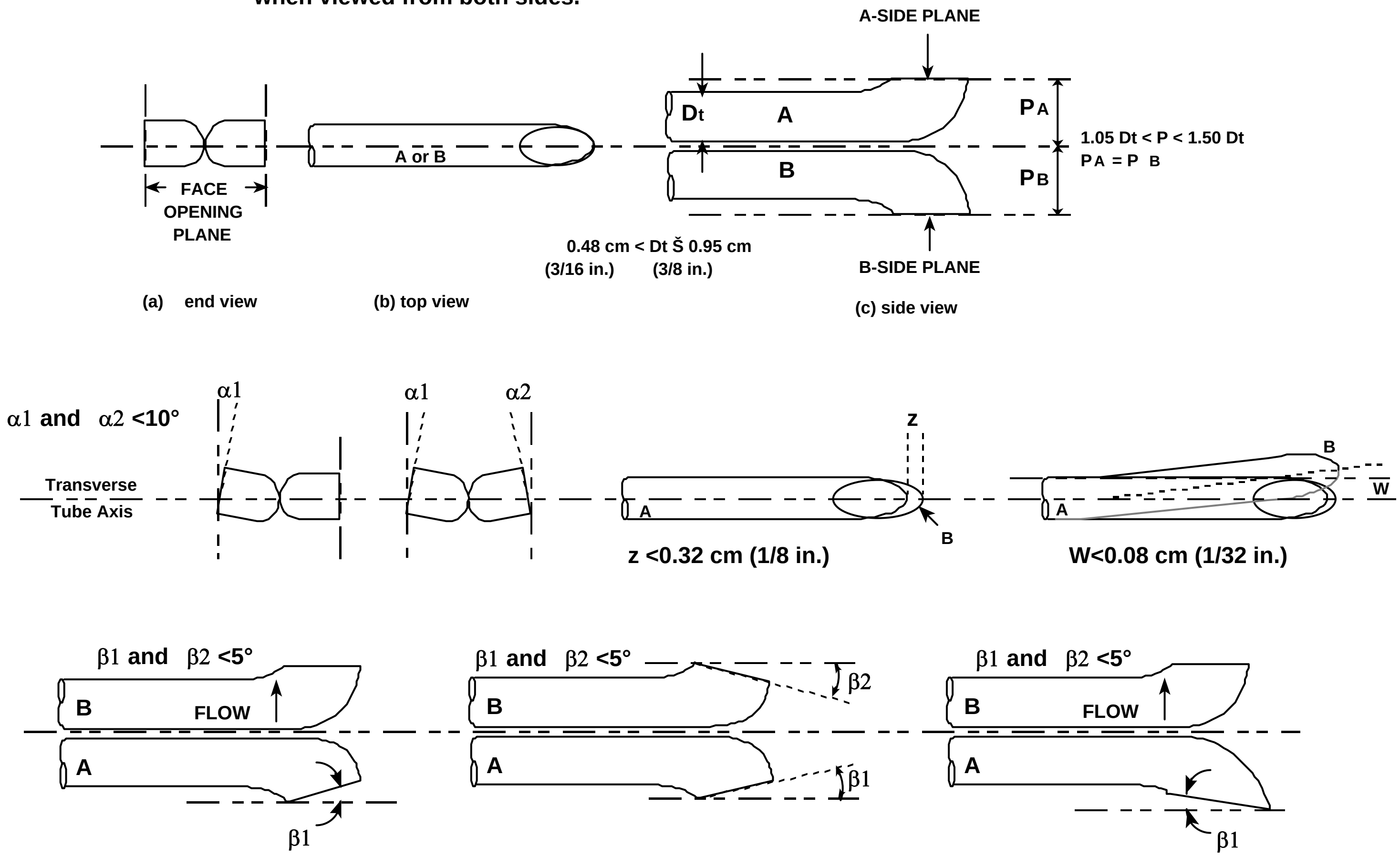
serial number	101			102A			102C			103A		
Span (in H2O)	**0.25**	**2**	**25**	**0.25**	**2**	**25**	**0.25**	**2**	**25**	**0.25**	**2**	**10**
Reference Reading @ 0% Span (in H2O)	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Device Reading (in H2O)	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
% Difference (Allowed = 0.05)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reference Reading @ 50% Span (in H2O)	0.120	0.95	4.73	0.125	1.00	9.64	0.131	0.90	9.30	0.12	0.95	5.15
Device Reading (in H2O)	0.122	0.96	4.90	0.126	0.98	9.75	0.129	0.88	9.00	0.12	0.92	5.20
% Difference (Allowed = 0.05)	1.67	1.05	3.59	0.80	2.00	1.14	1.53	2.22	3.23	2.56	3.16	0.97
Reference Reading @ 90% Span (in H2O)	0.220	1.88	23.50	2.32	1.85	23.30	0.250	2.00	22.80	0.248	1.91	9.50
Device Reading (in H2O)	0.222	1.83	24.20	2.300	1.90	24.00	0.243	1.97	23.30	0.240	1.95	9.20
% Difference (Allowed = 0.05)	0.91	2.66	2.98	0.86	2.70	3.00	2.80	1.50	2.19	3.23	2.09	3.16

serial number	103B						104		
Span (in H2O)	**0.25**	**0.5**	**1**	**2**	**5**	**25**	**0.25**	**2**	**10**
Reference Reading @ 0% Span (in H2O)	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.00	0.00
Device Reading (in H2O)	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.00	0.00
% Difference (Allowed = 0.05)	0.000	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
Reference Reading @ 50% Span (in H2O)	0.130	0.260	0.50	9.40	2.43	9.70	0.120	0.99	4.73
Device Reading (in H2O)	0.124	0.260	0.48	9.40	2.54	9.50	0.120	0.98	4.90
% Difference (Allowed = 0.05)	4.615	0.00	4.00	0.00	4.53	2.06	0.000	1.02	3.47
Reference Reading @ 90% Span (in H2O)	0.261	0.500	0.85	1.89	4.52	24.5	0.248	1.67	8.20
Device Reading (in H2O)	0.249	0.495	0.81	1.88	4.64	25.0	0.240	1.74	8.60
% Difference (Allowed = 0.05)	4.598	1.00	4.71	0.53	2.65	2.04	3.333	4.02	4.65

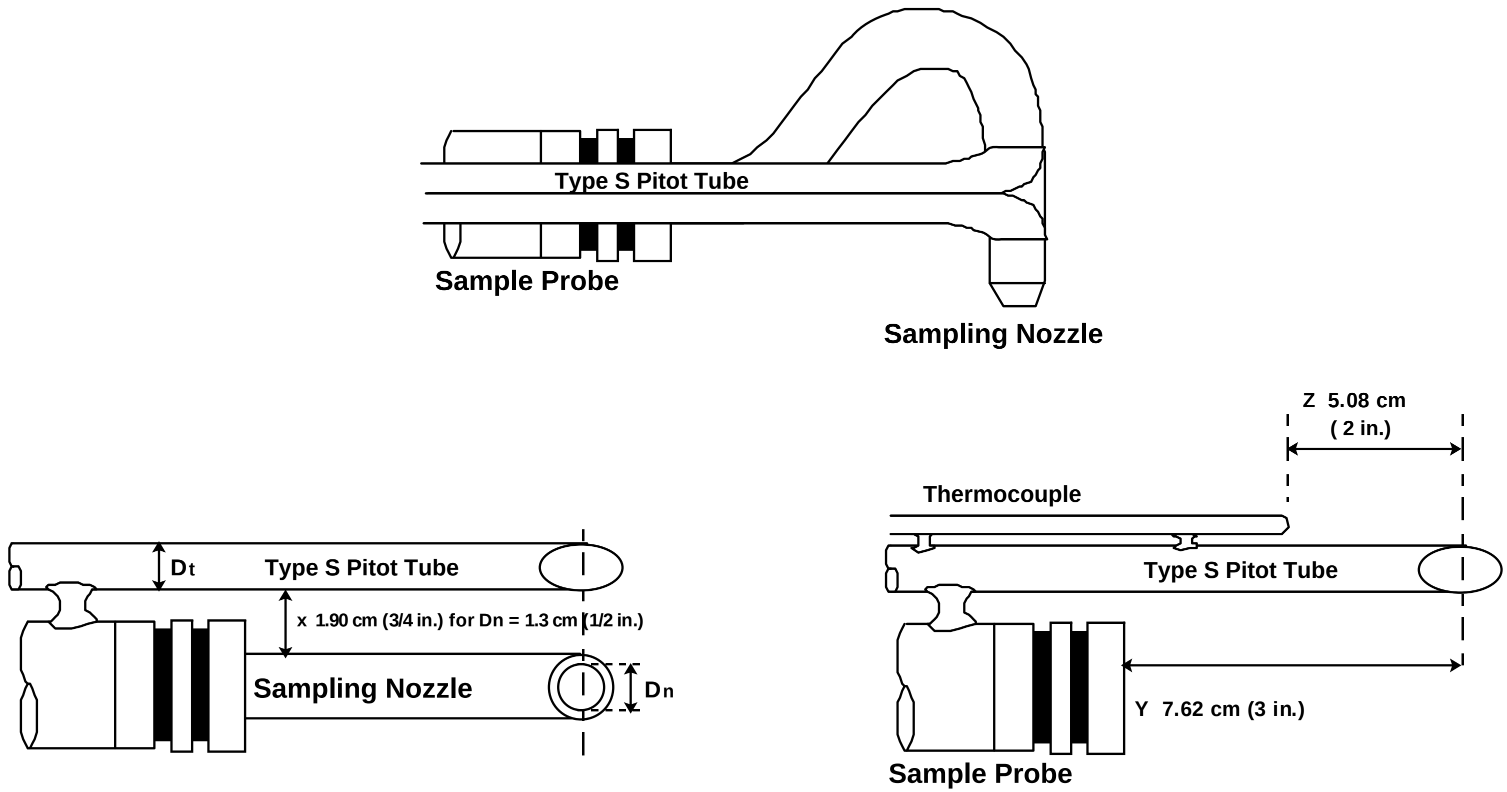
serial number	105			106		
Span (in H2O)	**0.25**	**2**	**25**	**0.5**	**4**	**15**
Reference Reading @ 0% Span (in H2O)	0.000	0.00	0.00	0.000	0.00	0.00
Device Reading (in H2O)	0.000	0.00	0.00	0.000	0.00	0.00
% Difference (Allowed = 0.05)	0.000	0.00	0.00	0.000	0.00	0.00
Reference Reading @ 50% Span (in H2O)	0.122	0.97	8.90	0.233	1.86	8.00
Device Reading (in H2O)	0.123	0.95	9.30	0.232	1.95	7.90
% Difference (Allowed = 0.05)	0.820	2.11	4.30	0.431	4.62	1.27
Reference Reading @ 90% Span (in H2O)	0.239	1.92	24.5	0.470	3.60	14.4
Device Reading (in H2O)	0.235	1.98	23.7	0.461	3.60	14.8
% Difference (Allowed = 0.05)	1.702	3.03	3.38	1.952	0.00	2.70
Calibration Date 12/30/2008 By MC						

Type S pitot tube construction details:

a) end view; face opening planes perpendicular to transverse axis.
b) top view; face opening planes parallel to longitudinal axis.
c) side view; both legs of equal length and centerlines coincident, when viewed from both sides.



Sampling Nozzle, Thermocouple, and Probe Configuration



APPENDIX B FIELD DATA SHEETS

Sanders Engineering & Analytical Services, Inc.

Moisture - EPA Method 4

COMPANY Hunt DATE 4-27-10 BOX No. ______ DHa 2.031 Y .974

PLANT Tuscaloosa OPERATOR EJ / BH UNIT #2 SRU

BALANCE No. 105 STD. WT. (gm) 2000 BALANCE RESPONCE (gm) 1997.6

Run # 1

METER READING	LEAK CHECK Pre	LEAK CHECK Post
099.905 (Final)		
059.100 (Initial)	10 (in. Hg)	5 (in. Hg)
40.805 (Net)	0.00 (CFM)	0.00 (CFM)

VOLUME OF LIQUID WATER COLLECTED ml. - gr.

	Imp 1	Imp 2	Imp 3	Imp 4
Final	140	0	/	1749.9
Initial	100	0	/	1735.5
Net	40	0		14.4
			Total	54.4

Pressure STATIC	BAROMETRIC	Gas Analysis	
-.45 (in. H2O)	29.8 (in. Hg)	O_2 %	
		CO_2 %	0.5
		CO %	—

Time	Gas Meter Volume Cu. Ft.	ΔH In. H_2O	Meter Temp	Imp. Temp
~~6:14~~ 7:14	59.100	1.5	60	45
6:19	62.1	1.5	60	45
6:24	65.3	1.5	60	45
6:29	068.8	1.5	60	45
6:34	072.6	1.5	61	47
6:39	076.0	1.5	61	47
6:44	079.3	1.5	62	48
6:49	082.7	1.5	63	48
6:54	086.1	1.5	64	50
6:59	089.5	1.5	64	52
7:04	092.9	1.5	65	52
7:09	096.2	1.5	65	54
8:14	099.905			

Run # 2

METER READING	LEAK CHECK Pre	LEAK CHECK Post
140.800 (Final)		
100.200 (Initial)	8 (in. Hg)	6 (in. Hg)
40.600 (Net)	0.00 (CFM)	0.00 (CFM)

VOLUME OF LIQUID WATER COLLECTED ml. - gr.

	Imp 1	Imp 2	Imp 3	Imp 4
Final	154	0	/	1756.1
Initial	100	0	/	1749.9
Net	54	0		6.2
			Total	60.2

Pressure STATIC	BAROMETRIC	Gas Analysis	
-.45 (in. H2O)	29.8 (in. Hg)	O_2 %	
		CO_2 %	0.5
		CO %	—

Time	Gas Meter Volume Cu. Ft.	ΔH In. H_2O	Meter Temp	Imp. Temp
8:30	100.200	1.5	65	48
7:35	103.5	1.5	65	48
7:40	106.9	1.5	66	47
7:45	110.3	1.5	67	47
7:50	113.7	1.5	67	47
7:55	117.1	1.5	68	48
8:00	120.6	1.5	69	48
8:05	124.0	1.5	69	48
8:10	127.4	1.5	70	49
8:15	130.8	1.5	71	50
8:20	134.1	1.5	71	50
8:25	137.4	1.5	72	50
~~8:30~~ 9:30	140.800			

Run # 3

METER READING	LEAK CHECK Pre	LEAK CHECK Post
181.920 (Final)		
141.000 (Initial)	10 (in. Hg)	(in. Hg)
40.920 (Net)	0.00 (CFM)	(CFM)

VOLUME OF LIQUID WATER COLLECTED ml. - gr.

	Imp 1	Imp 2	Imp 3	Imp 4
Final	152	0	/	1765.8
Initial	100	0	/	1756.1
Net	52	0		9.7
			Total	61.7

Pressure STATIC	BAROMETRIC	Gas Analysis	
-.45 (in. H2O)	29.8 (in. Hg)	O_2 %	
		CO_2 %	0.5
		CO %	—

Time	Gas Meter Volume Cu. Ft.	ΔH In. H_2O	Meter Temp	Imp. Temp
~~8:45~~ 9:45	141.000	1.5	72	45
8:50	144.4	1.5	72	45
8:55	147.8	1.5	72	45
9:00	151.2	1.5	72	45
9:05	154.6	1.5	73	48
9:10	158.0	1.5	73	48
9:15	161.4	1.5	73	50
9:20	164.8	1.5	74	50
9:25	168.2	1.5	75	51
9:30	171.6	1.5	75	53
9:35	175.0	1.5	76	53
9:40	178.4	1.5	76	55
10:45	181.920			

Form Revised 2/15/10

Comments:

[signature] 4/27/10 ADEM

Velocity & Temperature Field Data Sheet

Company: Hunt Plant: Tuscaloosa Unit: #2 SRU Date: 4-27-10

Run:	1			2			3					
Duct Dimensions:												
Start/Finish Time:	7:15 / 7:20			8:32 / 8:37			9:46 / 9:51			/		
% O₂:		% CO₂:			% CO₂:			% CO₂:			% CO₂:	
% H2O: Dry Bulb (°F)		Wet Bulb			Wet Bulb			Wet Bulb			Wet Bulb	
Pbar:		Static:	-.45		Static:	-.45		Static:	-.45		Static:	
Team Members:	EJ / BH			EJ / BH			EJ / BH					
Post Leak check	✓			✓			✓					

Point/ Port	ΔP	Stack Temp °F	Point/ Port	ΔP	Stack Temp °F	Point/ Port	ΔP	Stack Temp °F	Point/ Port	ΔP	Stack Temp °F
1-1	.08	526	1-1	.065	546	1-1	.06	560			
2	.085	536	2	.07	552	2	.07	564			
3	.09	555	3	.07	559	3	.07	567			
4	.09	549	4	.075	561	4	.07	565			
5	.08	536	5	.065	554	5	.065	535			
6	.07	521	6	.065	531	6	.06	521			
2-1	.07	553	2-1	.065	503	2-1	.065	543			
2	.075	564	2	.08	518	2	.075	560			
3	.075	566	3	.08	531	3	.08	563			
4	.075	562	4	.08	535	4	.08	544			
5	.07	550	5	.075	528	5	.07	535			
6	.065	527	6	.070	500	6	.07	524			

DWD ADEM 4/27/10

Form Revised 8/24/02

APPENDIX C GAS CERTIFICATIONS

IWS Specialty Gases
111 Buras Drive
Belle Chasse, LA 70037
504-392-2400

Certificate of Analysis
EPA Protocol Gas Mixture

Cylinder Number	**CC252285**	Customer **Southern Gas**		Certification Date	**12 Mar 2008**
Cylinder Size	**150AL**			Expiration Date	**12 Sep 2008**
Cylinder Pressure	**2000 psig**			Lot Number	**0802190117**
Cylinder Contents	**142 ft3**	PO Number **47949-1**		Part Number	**GSPECAND50P150(**
Cylinder CGA	**660**				

Component	Requested Concentration	Certified Concentration	Accuracy	Procedure
Nitrogen Dioxide	50 PPM	46.63 PPM	+/- 1 %	G1
Air	Balance	Balance		

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Nitrogen Dioxide	CAL015669	1684b	97.45 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Eco Physics - CLD 700 EL	73236	Chemiluminescence	11 Mar 2008

1st Analysis		Date: 02/29/08				2nd Analysis		Date: 03/11/08					
R	97.50	S	46.80	Z	0.00	R	97.50	S	46.50	Z	0.00	1st Analysis	46.78
S	46.80	Z	0.00	R	97.50	S	46.50	Z	0.00	R	97.50	2nd Analysis	46.48
Z	0.00	R	97.50	S	46.80	Z	0.00	R	97.50	S	46.50	Relative Difference	0.64%

This calibration standard certified per the 1997 EPA Traceability Protocol (EPA-600/97/121), using procedure listed. All values certified to be NIST traceable.

Do not use this cylinder below 150 psig.

Authorizing Signature: ____________________

SANDERS ENGINEERING & ANALYTICAL SERVICES, INC.
Phone: 251-633-4120
Fax: 251-633-2285
2255 Schillinger Road N.
Semmes, AL 36575

RECERTIFICATION OF ANALYSIS

CUSTOMER

Sanders Engineering
2255 Schillinger Rd. N
Mobile, AL 36575

CYLINDER NO	CC252285
EXPIRATION DATE	9/12/2010
ORIGINAL CERTIFICATION DATE	3/12/2008
RECERTIFICATION DATE	3/12/2010
PART NUMBER	NA
REFFERENCE NUMBER	NA

Do not use this cylinder below 150 psig. i.e. 1.0 Megapascal

Analytical Results

Component		
Nitrogen Dioxide	**Certified Concentration on 03/12/08**	**46.63** ppm
	Reanalyzed Concentration on 3/12/10	45.26 ppm

Reanalysis is within 5 % of Original Certification. Certified Concentration is the Original Value.

Analytical Instruments Used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration Check
TEMET Gasmet DX4000	FTIR	3/12/2010

IWS Gas and Supply
111 Buras Drive
Belle Chasse, LA 70037
504-392-2400

Certificate of Analysis
EPA Protocol Gas Mixture

Cylinder Number	**EB0016156**	Customer	**Southern Gas & Supply**	Certification Date	**30 Mar 2009**
Cylinder Size	**150AL**			Expiration Date	**30 Mar 2011**
Cylinder Pressure	**2000 psig**			Lot Number	**0903180419**
Cylinder Contents	**148 ft3**	PO Number	**327047-1**	Part Number	**GSPE5NB150AG05C**
Cylinder CGA	**660**				

Component	Requested Concentration	Certified Concentration	Accuracy	Procedure
Carbon Monoxide	50 PPM	49.79 PPM	+/- 1 %	G1
Nitric Oxide	50 PPM	49.10 PPM	+/- 1 %	G1
Sulfur Dioxide	50 PPM	50.03 PPM	+/- 1 %	G1
Carbon Dioxide	10 %	9.902 %	+/- 1 %	G1
Nitrogen	Balance	Balance	NOX conc. = 49.1 PPM	

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Carbon Monoxide	CC250365	GMIS	247.8 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Siemens - Ultramat 6	N1-U5-0234	NDIR	16 Mar 2009

1st Analysis		Date: 03/23/09				2nd Analysis		Date: 03/30/09					
R	247.80	S	49.72	Z	0.00	R	247.80	S	49.85	Z	0.00	1st Analysis	49.72
S	49.72	Z	0.00	R	247.80	S	49.85	Z	0.00	R	247.80	2nd Analysis	49.85
Z	0.00	R	247.80	S	49.72	Z	0.00	R	247.80	S	49.85	Relative Difference	0.26%

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Nitric Oxide	CC250374	GMIS	96.6 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Eco Physics - CLD 700 EL	73236	Chemiluminescence	16 Mar 2009

1st Analysis		Date: 03/23/09				2nd Analysis		Date: 03/30/09					
R	96.60	S	49.00	Z	0.00	R	96.60	S	49.20	Z	0.00	1st Analysis	49.00
S	49.00	Z	0.00	R	96.60	S	49.20	Z	0.00	R	96.60	2nd Analysis	49.20
Z	0.00	R	96.60	S	49.00	Z	0.00	R	96.60	S	49.20	Relative Difference	0.41%

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Sulfur Dioxide	CC250503	GMIS	48.55 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Siemens - Ultramat 6	N1-U5-0236	NDIR	16 Mar 2009

1st Analysis		Date: 03/23/09				2nd Analysis		Date: 03/30/09					
R	48.55	S	50.00	Z	0.00	R	48.55	S	50.06	Z	0.00	1st Analysis	50.00
S	50.00	Z	0.00	R	48.55	S	50.06	Z	0.00	R	48.55	2nd Analysis	50.06
Z	0.00	R	48.55	S	50.00	Z	0.00	R	48.55	S	50.06	Relative Difference	0.12%

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Carbon Dioxide	CAL016183	SRM2745	15.633 %
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Siemens - Ultramat/Oxymat 6	N1-U5-0235	NDIR/Paramagnetic	16 Mar 2009

1st Analysis		Date: 03/30/09					
R	15.633	S	9.902	Z	0.000	1st Analysis	9.902
S	9.902	Z	0.000	R	15.633		
Z	0.000	R	15.633	S	9.902		

This calibration standard certified per the 1997 EPA Traceability Protocol (EPA-600/97/121), using procedure listed.
All values, **excluding NOX concentration,** certified to be NIST traceable.

Do not use this cylinder below 150 psig.

Authorizing Signature: ______________________

IWS Specialty Gases
111 Buras Drive
Belle Chasse, LA 70037
504-392-2400

Certificate of Analysis
EPA Protocol Gas Mixture

Cylinder Number	**CC249422**	Customer	**Southern Gas & Supply**	Certification Date	**14 Jul 2009**
Cylinder Size	**150AL**			Expiration Date	**14 Jul 2011**
Cylinder Pressure	**2000 psig**			Lot Number	**0907011033**
Cylinder Contents	**145 ft3**	PO Number	**331500-1**	Part Number	**GSPE5NB150AG01C**
Cylinder CGA	**660**				

Component	Requested Concentration	Certified Concentration	Accuracy	Procedure
Carbon Monoxide	125 PPM	122.9 PPM	+/- 1 %	G1
Nitric Oxide	125 PPM	122.0 PPM	+/- 1 %	G1
Sulfur Dioxide	125 PPM	125.0 PPM	+/- 1 %	G1
Carbon Dioxide	5 %	4.883 %	+/- 1 %	G1
Nitrogen	Balance	Balance	NOX conc. = 122 PPM	

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Carbon Monoxide	CC250365	GMIS	247.8 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Siemens - Ultramat 6	N1-U5-0234	NDIR	16 Jun 2009

1st Analysis		Date: 07/07/09				2nd Analysis		Date: 07/14/09					
R	247.8	S	122.8	Z	0.00	R	247.8	S	122.9	Z	0.00	1st Analysis	122.8
S	122.8	Z	0.00	R	247.8	S	122.9	Z	0.00	R	247.8	2nd Analysis	122.9
Z	0.00	R	247.8	S	122.8	Z	0.00	R	247.8	S	122.9	Relative Difference	0.08%

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Nitric Oxide	CC250469	GMIS	978.3 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Eco Physics - CLD 700 EL	73236	Chemiluminescence	16 Jun 2009

1st Analysis		Date: 07/07/09				2nd Analysis		Date: 07/14/09					
R	978.0	S	122.0	Z	0.00	R	978.0	S	122.0	Z	0.00	1st Analysis	122.0
S	122.0	Z	0.00	R	978.0	S	122.0	Z	0.00	R	978.0	2nd Analysis	122.0
Z	0.00	R	978.0	S	122.0	Z	0.00	R	978.0	S	122.0		0.00%

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Sulfur Dioxide	CC250501	GMIS	493.6 PPM
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Siemens - Ultramat 6	N1-U5-0236	NDIR	16 Jun 2009

1st Analysis		Date: 07/07/09				2nd Analysis		Date: 07/14/09					
R	493.6	S	125.0	Z	0.00	R	493.6	S	125.0	Z	0.00	1st Analysis	125.0
S	125.0	Z	0.00	R	493.6	S	125.0	Z	0.00	R	493.6	2nd Analysis	125.0
Z	0.00	R	493.6	S	125.0	Z	0.00	R	493.6	S	125.0		0.00%

Component	*Standard Cylinder*	*Reference Number*	*Reference Concentration*
Carbon Dioxide	CAL016183	SRM2745	15.633 %
Instrument Make-Model	***Serial Number***	***Analytical Principle***	***Calibration date***
Siemens - Ultramat/Oxymat 6	N1-U5-0235	NDIR/Paramagnetic	16 Jun 2009

1st Analysis		Date: 07/14/09					
R	15.630	S	4.882	Z	0.000	1st Analysis	4.883
S	4.882	Z	0.000	R	15.630		
Z	0.000	R	15.630	S	4.882		

This calibration standard certified per the 1997 EPA Traceability Protocol (EPA-600/97/121), using procedure listed. All values, **excluding NOX concentration**, certified to be NIST traceable.

Do not use this cylinder below 150 psig.

Authorizing Signature: ____________________

AIR LIQUIDE

11426 Fairmont Pkwy, LaPorte, TX 77571 (281)474-8400

EPA Protocol

EPA-600/R-97/121

Section 2.2 Procedure G-1

Customer: Sanders Engineering

S.O. #: 33140356
Trnsf. # : 33140356
P.O. # : 09-0407-JCS
Item# :

Cylinder # :	Lot # :	Valve:
CC90535	LPX251109	CGA590

Component	Concentration (Mole)	
Nitrogen	Balance	
Oxygen	10.6	±0.1 %

Assay Date:	Expiration Date:	*Cyl. Press:
28-Apr-09	27-Apr-12	1900psig

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

Mid-Range Stack Testing
Al# 88080

APPENDIX D POLLUTANT MONITOR CONCENTRATIONS

SO2 (Compensated)								
tag	time	1m avg		time	1m avg		time	1m avg
S201877-AT_C.1	4/27/10 7:14	41.7		4/27/10 8:30	42.1		4/27/10 9:45	42
S201877-AT_C.1	4/27/10 7:15	41.6		4/27/10 8:31	42.1		4/27/10 9:46	42
S201877-AT_C.1	4/27/10 7:16	41.4		4/27/10 8:32	42.1		4/27/10 9:47	42
S201877-AT_C.1	4/27/10 7:17	41.3		4/27/10 8:33	42		4/27/10 9:48	42
S201877-AT_C.1	4/27/10 7:18	41.2		4/27/10 8:34	42		4/27/10 9:49	42
S201877-AT_C.1	4/27/10 7:19	41.1		4/27/10 8:35	42		4/27/10 9:50	42
S201877-AT_C.1	4/27/10 7:20	41		4/27/10 8:36	42		4/27/10 9:51	42
S201877-AT_C.1	4/27/10 7:21	41		4/27/10 8:37	42		4/27/10 9:52	42
S201877-AT_C.1	4/27/10 7:22	40.9		4/27/10 8:38	42		4/27/10 9:53	42
S201877-AT_C.1	4/27/10 7:23	40.9		4/27/10 8:39	42.2		4/27/10 9:54	42.1
S201877-AT_C.1	4/27/10 7:24	40.8		4/27/10 8:40	42.4		4/27/10 9:55	42.4
S201877-AT_C.1	4/27/10 7:25	40.7		4/27/10 8:41	42.6		4/27/10 9:56	42.7
S201877-AT_C.1	4/27/10 7:26	40.7		4/27/10 8:42	42.7		4/27/10 9:57	43
S201877-AT_C.1	4/27/10 7:27	40.6		4/27/10 8:43	42.7		4/27/10 9:58	43.4
S201877-AT_C.1	4/27/10 7:28	40.6		4/27/10 8:44	42.7		4/27/10 9:59	43.7
S201877-AT_C.1	4/27/10 7:29	40.5		4/27/10 8:45	42.6		4/27/10 10:00	44
S201877-AT_C.1	4/27/10 7:30	40.5		4/27/10 8:46	42.6		4/27/10 10:01	50.4
S201877-AT_C.1	4/27/10 7:31	40.5		4/27/10 8:47	42.5		4/27/10 10:02	59.7
S201877-AT_C.1	4/27/10 7:32	40.6		4/27/10 8:48	42.5		4/27/10 10:03	53.6
S201877-AT_C.1	4/27/10 7:33	40.7		4/27/10 8:49	42.5		4/27/10 10:04	47.7
S201877-AT_C.1	4/27/10 7:34	40.7		4/27/10 8:50	42.4		4/27/10 10:05	44.5
S201877-AT_C.1	4/27/10 7:35	40.8		4/27/10 8:51	42.3		4/27/10 10:06	44.4
S201877-AT_C.1	4/27/10 7:36	40.9		4/27/10 8:52	42.2		4/27/10 10:07	44.4
S201877-AT_C.1	4/27/10 7:37	40.9		4/27/10 8:53	42		4/27/10 10:08	44.3
S201877-AT_C.1	4/27/10 7:38	41		4/27/10 8:54	41.8		4/27/10 10:09	44.3
S201877-AT_C.1	4/27/10 7:39	41		4/27/10 8:55	41.6		4/27/10 10:10	44.3
S201877-AT_C.1	4/27/10 7:40	40.8		4/27/10 8:56	41.4		4/27/10 10:11	44.3
S201877-AT_C.1	4/27/10 7:41	40.6		4/27/10 8:57	41.2		4/27/10 10:12	44.3
S201877-AT_C.1	4/27/10 7:42	40.4		4/27/10 8:58	41.1		4/27/10 10:13	44.3
S201877-AT_C.1	4/27/10 7:43	40.3		4/27/10 8:59	40.9		4/27/10 10:14	44.2
S201877-AT_C.1	4/27/10 7:44	40.1		4/27/10 9:00	40.8		4/27/10 10:15	44.2
S201877-AT_C.1	4/27/10 7:45	39.9		4/27/10 9:01	40.9		4/27/10 10:16	44
S201877-AT_C.1	4/27/10 7:46	39.7		4/27/10 9:02	41		4/27/10 10:17	43.9
S201877-AT_C.1	4/27/10 7:47	39.5		4/27/10 9:03	41.1		4/27/10 10:18	43.7
S201877-AT_C.1	4/27/10 7:48	39.5		4/27/10 9:04	41.2		4/27/10 10:19	43.6
S201877-AT_C.1	4/27/10 7:49	39.7		4/27/10 9:05	41.3		4/27/10 10:20	43.4
S201877-AT_C.1	4/27/10 7:50	39.9		4/27/10 9:06	41.4		4/27/10 10:21	43.3
S201877-AT_C.1	4/27/10 7:51	40.1		4/27/10 9:07	41.5		4/27/10 10:22	43.1
S201877-AT_C.1	4/27/10 7:52	40.3		4/27/10 9:08	41.6		4/27/10 10:23	43
S201877-AT_C.1	4/27/10 7:53	40.5		4/27/10 9:09	41.7		4/27/10 10:24	43
S201877-AT_C.1	4/27/10 7:54	40.7		4/27/10 9:10	41.8		4/27/10 10:25	43.3
S201877-AT_C.1	4/27/10 7:55	40.9		4/27/10 9:11	41.8		4/27/10 10:26	43.6
S201877-AT_C.1	4/27/10 7:56	41.1		4/27/10 9:12	41.9		4/27/10 10:27	43.9
S201877-AT_C.1	4/27/10 7:57	42.4		4/27/10 9:13	42		4/27/10 10:28	44.2
S201877-AT_C.1	4/27/10 7:58	44.5		4/27/10 9:14	42		4/27/10 10:29	44.5
S201877-AT_C.1	4/27/10 7:59	44.3		4/27/10 9:15	42.1		4/27/10 10:30	44.8
S201877-AT_C.1	4/27/10 8:00	43.5		4/27/10 9:16	42.2		4/27/10 10:31	45.1
S201877-AT_C.1	4/27/10 8:01	41.7		4/27/10 9:17	42.2		4/27/10 10:32	45.4
S201877-AT_C.1	4/27/10 8:02	40.5		4/27/10 9:18	42.2		4/27/10 10:33	45.5
S201877-AT_C.1	4/27/10 8:03	40.5		4/27/10 9:19	41.9		4/27/10 10:34	45.2
S201877-AT_C.1	4/27/10 8:04	40.6		4/27/10 9:20	41.7		4/27/10 10:35	44.8
S201877-AT_C.1	4/27/10 8:05	40.6		4/27/10 9:21	41.5		4/27/10 10:36	44.5
S201877-AT_C.1	4/27/10 8:06	40.7		4/27/10 9:22	41.2		4/27/10 10:37	44.1
S201877-AT_C.1	4/27/10 8:07	40.7		4/27/10 9:23	41		4/27/10 10:38	43.8
S201877-AT_C.1	4/27/10 8:08	40.8		4/27/10 9:24	40.8		4/27/10 10:39	43.5
S201877-AT_C.1	4/27/10 8:09	40.8		4/27/10 9:25	40.5		4/27/10 10:40	43.1
S201877-AT_C.1	4/27/10 8:10	40.9		4/27/10 9:26	40.3		4/27/10 10:41	42.8
S201877-AT_C.1	4/27/10 8:11	40.9		4/27/10 9:27	40.2		4/27/10 10:42	42.8
S201877-AT_C.1	4/27/10 8:12	40.8		4/27/10 9:28	40.3		4/27/10 10:43	43.5
S201877-AT_C.1	4/27/10 8:13	40.7		4/27/10 9:29	40.4		4/27/10 10:44	44.2
S201877-AT_C.1	4/27/10 8:14	40.7		4/27/10 9:30	40.5		4/27/10 10:45	44.9
S201877-AT_C.1	4/27/10 8:15	40.6		4/27/10 9:31	40.6		4/27/10 10:46	45.6
S201877-AT_C.1	4/27/10 8:16	40.5		4/27/10 9:32	40.7		4/27/10 10:47	45.9
S201877-AT_C.1	4/27/10 8:17	40.4		4/27/10 9:33	40.8		4/27/10 10:48	45.5

O2								
tag	time	1m avg		time	1m avg		time	1m avg
S201877-AT_D.1	4/27/10 7:14	3.8		4/27/10 8:30	3.8		4/27/10 9:45	3.9
S201877-AT_D.1	4/27/10 7:15	3.8		4/27/10 8:31	3.8		4/27/10 9:46	3.9
S201877-AT_D.1	4/27/10 7:16	3.8		4/27/10 8:32	3.8		4/27/10 9:47	3.9
S201877-AT_D.1	4/27/10 7:17	3.8		4/27/10 8:33	3.8		4/27/10 9:48	3.9
S201877-AT_D.1	4/27/10 7:18	3.8		4/27/10 8:34	3.8		4/27/10 9:49	3.9
S201877-AT_D.1	4/27/10 7:19	3.8		4/27/10 8:35	3.8		4/27/10 9:50	3.9
S201877-AT_D.1	4/27/10 7:20	3.8		4/27/10 8:36	3.8		4/27/10 9:51	3.9
S201877-AT_D.1	4/27/10 7:21	3.8		4/27/10 8:37	3.8		4/27/10 9:52	3.9
S201877-AT_D.1	4/27/10 7:22	3.8		4/27/10 8:38	3.8		4/27/10 9:53	3.9
S201877-AT_D.1	4/27/10 7:23	3.8		4/27/10 8:39	3.8		4/27/10 9:54	3.9
S201877-AT_D.1	4/27/10 7:24	3.8		4/27/10 8:40	3.8		4/27/10 9:55	3.9
S201877-AT_D.1	4/27/10 7:25	3.8		4/27/10 8:41	3.8		4/27/10 9:56	3.9
S201877-AT_D.1	4/27/10 7:26	3.8		4/27/10 8:42	3.8		4/27/10 9:57	3.9
S201877-AT_D.1	4/27/10 7:27	3.8		4/27/10 8:43	3.8		4/27/10 9:58	3.9
S201877-AT_D.1	4/27/10 7:28	3.8		4/27/10 8:44	3.8		4/27/10 9:59	3.9
S201877-AT_D.1	4/27/10 7:29	3.8		4/27/10 8:45	3.8		4/27/10 10:00	3.9
S201877-AT_D.1	4/27/10 7:30	3.8		4/27/10 8:46	3.8		4/27/10 10:01	3.9
S201877-AT_D.1	4/27/10 7:31	3.8		4/27/10 8:47	3.8		4/27/10 10:02	3.9
S201877-AT_D.1	4/27/10 7:32	3.8		4/27/10 8:48	3.8		4/27/10 10:03	3.9
S201877-AT_D.1	4/27/10 7:33	3.8		4/27/10 8:49	3.8		4/27/10 10:04	3.9
S201877-AT_D.1	4/27/10 7:34	3.8		4/27/10 8:50	3.8		4/27/10 10:05	3.9
S201877-AT_D.1	4/27/10 7:35	3.8		4/27/10 8:51	3.8		4/27/10 10:06	3.9
S201877-AT_D.1	4/27/10 7:36	3.8		4/27/10 8:52	3.8		4/27/10 10:07	3.9
S201877-AT_D.1	4/27/10 7:37	3.8		4/27/10 8:53	3.8		4/27/10 10:08	3.9
S201877-AT_D.1	4/27/10 7:38	3.8		4/27/10 8:54	3.8		4/27/10 10:09	3.9
S201877-AT_D.1	4/27/10 7:39	3.8		4/27/10 8:55	3.8		4/27/10 10:10	3.9
S201877-AT_D.1	4/27/10 7:40	3.8		4/27/10 8:56	3.8		4/27/10 10:11	3.9
S201877-AT_D.1	4/27/10 7:41	3.8		4/27/10 8:57	3.8		4/27/10 10:12	3.9
S201877-AT_D.1	4/27/10 7:42	3.8		4/27/10 8:58	3.8		4/27/10 10:13	3.9
S201877-AT_D.1	4/27/10 7:43	3.8		4/27/10 8:59	3.8		4/27/10 10:14	3.9
S201877-AT_D.1	4/27/10 7:44	3.8		4/27/10 9:00	3.8		4/27/10 10:15	3.9
S201877-AT_D.1	4/27/10 7:45	3.8		4/27/10 9:01	3.8		4/27/10 10:16	3.9
S201877-AT_D.1	4/27/10 7:46	3.8		4/27/10 9:02	3.8		4/27/10 10:17	3.9
S201877-AT_D.1	4/27/10 7:47	3.8		4/27/10 9:03	3.8		4/27/10 10:18	3.9
S201877-AT_D.1	4/27/10 7:48	3.8		4/27/10 9:04	3.8		4/27/10 10:19	3.9
S201877-AT_D.1	4/27/10 7:49	3.8		4/27/10 9:05	3.8		4/27/10 10:20	3.9
S201877-AT_D.1	4/27/10 7:50	3.8		4/27/10 9:06	3.8		4/27/10 10:21	3.9
S201877-AT_D.1	4/27/10 7:51	3.8		4/27/10 9:07	3.8		4/27/10 10:22	3.9
S201877-AT_D.1	4/27/10 7:52	3.8		4/27/10 9:08	3.8		4/27/10 10:23	3.9
S201877-AT_D.1	4/27/10 7:53	3.8		4/27/10 9:09	3.8		4/27/10 10:24	3.9
S201877-AT_D.1	4/27/10 7:54	3.8		4/27/10 9:10	3.8		4/27/10 10:25	3.9
S201877-AT_D.1	4/27/10 7:55	3.8		4/27/10 9:11	3.8		4/27/10 10:26	3.9
S201877-AT_D.1	4/27/10 7:56	3.8		4/27/10 9:12	3.8		4/27/10 10:27	3.9
S201877-AT_D.1	4/27/10 7:57	3.8		4/27/10 9:13	3.8		4/27/10 10:28	3.9
S201877-AT_D.1	4/27/10 7:58	3.8		4/27/10 9:14	3.8		4/27/10 10:29	3.9
S201877-AT_D.1	4/27/10 7:59	3.8		4/27/10 9:15	3.8		4/27/10 10:30	3.9
S201877-AT_D.1	4/27/10 8:00	3.8		4/27/10 9:16	3.8		4/27/10 10:31	3.9
S201877-AT_D.1	4/27/10 8:01	3.8		4/27/10 9:17	3.8		4/27/10 10:32	3.9
S201877-AT_D.1	4/27/10 8:02	3.8		4/27/10 9:18	3.8		4/27/10 10:33	3.9
S201877-AT_D.1	4/27/10 8:03	3.8		4/27/10 9:19	3.8		4/27/10 10:34	3.9
S201877-AT_D.1	4/27/10 8:04	3.8		4/27/10 9:20	3.8		4/27/10 10:35	3.9
S201877-AT_D.1	4/27/10 8:05	3.8		4/27/10 9:21	3.8		4/27/10 10:36	3.9
S201877-AT_D.1	4/27/10 8:06	3.8		4/27/10 9:22	3.8		4/27/10 10:37	3.9
S201877-AT_D.1	4/27/10 8:07	3.8		4/27/10 9:23	3.8		4/27/10 10:38	3.9
S201877-AT_D.1	4/27/10 8:08	3.8		4/27/10 9:24	3.8		4/27/10 10:39	3.9
S201877-AT_D.1	4/27/10 8:09	3.8		4/27/10 9:25	3.8		4/27/10 10:40	3.9
S201877-AT_D.1	4/27/10 8:10	3.8		4/27/10 9:26	3.8		4/27/10 10:41	3.9
S201877-AT_D.1	4/27/10 8:11	3.8		4/27/10 9:27	3.8		4/27/10 10:42	3.9
S201877-AT_D.1	4/27/10 8:12	3.8		4/27/10 9:28	3.8		4/27/10 10:43	3.9
S201877-AT_D.1	4/27/10 8:13	3.8		4/27/10 9:29	3.8		4/27/10 10:44	3.9
S201877-AT_D.1	4/27/10 8:14	3.8		4/27/10 9:30	3.8		4/27/10 10:45	3.9
S201877-AT_D.1	4/27/10 8:15	3.8		4/27/10 9:31	3.8		4/27/10 10:46	3.9
S201877-AT_D.1	4/27/10 8:16	3.8		4/27/10 9:32	3.8		4/27/10 10:47	3.9
S201877-AT_D.1	4/27/10 8:17	3.8		4/27/10 9:33	3.8		4/27/10 10:48	3.9

SO2 (Uncompensated)								
tag	time	1m avg		time	1m avg		time	1m avg
S201877-AT_A.1	4/27/10 7:14	33.5		4/27/10 8:30	33.2		4/27/10 9:45	33.9
S201877-AT_A.1	4/27/10 7:15	33.1		4/27/10 8:31	33.2		4/27/10 9:46	34
S201877-AT_A.1	4/27/10 7:16	32.8		4/27/10 8:32	33.3		4/27/10 9:47	34
S201877-AT_A.1	4/27/10 7:17	32.5		4/27/10 8:33	33.3		4/27/10 9:48	34.1
S201877-AT_A.1	4/27/10 7:18	32.3		4/27/10 8:34	33.4		4/27/10 9:49	34.1
S201877-AT_A.1	4/27/10 7:19	32.2		4/27/10 8:35	33.4		4/27/10 9:50	34.2
S201877-AT_A.1	4/27/10 7:20	32		4/27/10 8:36	33.5		4/27/10 9:51	34.2
S201877-AT_A.1	4/27/10 7:21	31.9		4/27/10 8:37	33.5		4/27/10 9:52	34.1
S201877-AT_A.1	4/27/10 7:22	31.7		4/27/10 8:38	33.6		4/27/10 9:53	34
S201877-AT_A.1	4/27/10 7:23	31.6		4/27/10 8:39	33.6		4/27/10 9:54	33.9
S201877-AT_A.1	4/27/10 7:24	31.4		4/27/10 8:40	33.6		4/27/10 9:55	33.9
S201877-AT_A.1	4/27/10 7:25	31.3		4/27/10 8:41	33.5		4/27/10 9:56	33.8
S201877-AT_A.1	4/27/10 7:26	31.2		4/27/10 8:42	33.5		4/27/10 9:57	33.7
S201877-AT_A.1	4/27/10 7:27	31.2		4/27/10 8:43	33.5		4/27/10 9:58	33.6
S201877-AT_A.1	4/27/10 7:28	31.2		4/27/10 8:44	33.4		4/27/10 9:59	33.5
S201877-AT_A.1	4/27/10 7:29	31.2		4/27/10 8:45	33.4		4/27/10 10:00	34
S201877-AT_A.1	4/27/10 7:30	31.2		4/27/10 8:46	33.4		4/27/10 10:01	39.9
S201877-AT_A.1	4/27/10 7:31	31.2		4/27/10 8:47	33.3		4/27/10 10:02	47.5
S201877-AT_A.1	4/27/10 7:32	31.2		4/27/10 8:48	33.3		4/27/10 10:03	43
S201877-AT_A.1	4/27/10 7:33	31.2		4/27/10 8:49	33.3		4/27/10 10:04	38.2
S201877-AT_A.1	4/27/10 7:34	31.2		4/27/10 8:50	33.3		4/27/10 10:05	35
S201877-AT_A.1	4/27/10 7:35	31.2		4/27/10 8:51	33.3		4/27/10 10:06	34.9
S201877-AT_A.1	4/27/10 7:36	31.2		4/27/10 8:52	33.3		4/27/10 10:07	34.9
S201877-AT_A.1	4/27/10 7:37	31.2		4/27/10 8:53	33.3		4/27/10 10:08	34.8
S201877-AT_A.1	4/27/10 7:38	31.2		4/27/10 8:54	33.3		4/27/10 10:09	34.8
S201877-AT_A.1	4/27/10 7:39	31.2		4/27/10 8:55	33.3		4/27/10 10:10	34.7
S201877-AT_A.1	4/27/10 7:40	31.2		4/27/10 8:56	33.3		4/27/10 10:11	34.7
S201877-AT_A.1	4/27/10 7:41	31.2		4/27/10 8:57	33.3		4/27/10 10:12	34.6
S201877-AT_A.1	4/27/10 7:42	31.2		4/27/10 8:58	33.4		4/27/10 10:13	34.6
S201877-AT_A.1	4/27/10 7:43	31.2		4/27/10 8:59	33.5		4/27/10 10:14	34.5
S201877-AT_A.1	4/27/10 7:44	31.2		4/27/10 9:00	33.6		4/27/10 10:15	34.5
S201877-AT_A.1	4/27/10 7:45	31.3		4/27/10 9:01	33.7		4/27/10 10:16	34.4
S201877-AT_A.1	4/27/10 7:46	31.3		4/27/10 9:02	33.8		4/27/10 10:17	34.3
S201877-AT_A.1	4/27/10 7:47	31.4		4/27/10 9:03	33.9		4/27/10 10:18	34.2
S201877-AT_A.1	4/27/10 7:48	31.4		4/27/10 9:04	34.1		4/27/10 10:19	34.1
S201877-AT_A.1	4/27/10 7:49	31.5		4/27/10 9:05	34.2		4/27/10 10:20	34.1
S201877-AT_A.1	4/27/10 7:50	31.5		4/27/10 9:06	34.2		4/27/10 10:21	34
S201877-AT_A.1	4/27/10 7:51	31.6		4/27/10 9:07	34.1		4/27/10 10:22	33.9
S201877-AT_A.1	4/27/10 7:52	31.6		4/27/10 9:08	34		4/27/10 10:23	33.8
S201877-AT_A.1	4/27/10 7:53	31.6		4/27/10 9:09	33.9		4/27/10 10:24	33.8
S201877-AT_A.1	4/27/10 7:54	31.6		4/27/10 9:10	33.9		4/27/10 10:25	34.1
S201877-AT_A.1	4/27/10 7:55	31.5		4/27/10 9:11	33.8		4/27/10 10:26	34.3
S201877-AT_A.1	4/27/10 7:56	31.4		4/27/10 9:12	33.7		4/27/10 10:27	34.5
S201877-AT_A.1	4/27/10 7:57	31.4		4/27/10 9:13	33.6		4/27/10 10:28	34.7
S201877-AT_A.1	4/27/10 7:58	31.3		4/27/10 9:14	33.5		4/27/10 10:29	34.9
S201877-AT_A.1	4/27/10 7:59	31.3		4/27/10 9:15	33.4		4/27/10 10:30	35.1
S201877-AT_A.1	4/27/10 8:00	31.2		4/27/10 9:16	33.2		4/27/10 10:31	35.4
S201877-AT_A.1	4/27/10 8:01	31.1		4/27/10 9:17	33		4/27/10 10:32	35.6
S201877-AT_A.1	4/27/10 8:02	31.1		4/27/10 9:18	32.8		4/27/10 10:33	35.6
S201877-AT_A.1	4/27/10 8:03	31.1		4/27/10 9:19	32.7		4/27/10 10:34	35.4
S201877-AT_A.1	4/27/10 8:04	31.3		4/27/10 9:20	32.5		4/27/10 10:35	35.1
S201877-AT_A.1	4/27/10 8:05	31.5		4/27/10 9:21	32.3		4/27/10 10:36	34.9
S201877-AT_A.1	4/27/10 8:06	31.8		4/27/10 9:22	32.1		4/27/10 10:37	34.6
S201877-AT_A.1	4/27/10 8:07	32		4/27/10 9:23	31.9		4/27/10 10:38	34.4
S201877-AT_A.1	4/27/10 8:08	32.2		4/27/10 9:24	31.8		4/27/10 10:39	34.1
S201877-AT_A.1	4/27/10 8:09	32.4		4/27/10 9:25	31.9		4/27/10 10:40	33.9
S201877-AT_A.1	4/27/10 8:10	32.6		4/27/10 9:26	32		4/27/10 10:41	33.6
S201877-AT_A.1	4/27/10 8:11	32.9		4/27/10 9:27	32		4/27/10 10:42	33.5
S201877-AT_A.1	4/27/10 8:12	33		4/27/10 9:28	32.1		4/27/10 10:43	33.6
S201877-AT_A.1	4/27/10 8:13	33		4/27/10 9:29	32.2		4/27/10 10:44	33.8
S201877-AT_A.1	4/27/10 8:14	33		4/27/10 9:30	32.2		4/27/10 10:45	33.9
S201877-AT_A.1	4/27/10 8:15	33		4/27/10 9:31	32.3		4/27/10 10:46	34
S201877-AT_A.1	4/27/10 8:16	33		4/27/10 9:32	32.4		4/27/10 10:47	34.2
S201877-AT_A.1	4/27/10 8:17	33		4/27/10 9:33	32.5		4/27/10 10:48	34.3

SO2 (Compensated)								
tag	time	1m avg		time	1m avg		time	1m avg
S201877-AT_C.1	4/28/10 9:58	64.6		4/28/10 11:13	65.2		4/28/10 12:26	56.2
S201877-AT_C.1	4/28/10 9:59	64.8		4/28/10 11:14	62.2		4/28/10 12:27	56.6
S201877-AT_C.1	4/28/10 10:00	65		4/28/10 11:15	60.6		4/28/10 12:28	57
S201877-AT_C.1	4/28/10 10:01	65.2		4/28/10 11:16	61.6		4/28/10 12:29	57.9
S201877-AT_C.1	4/28/10 10:02	65.4		4/28/10 11:17	62.5		4/28/10 12:30	59.5
S201877-AT_C.1	4/28/10 10:03	65.4		4/28/10 11:18	63.1		4/28/10 12:31	60.5
S201877-AT_C.1	4/28/10 10:04	65.2		4/28/10 11:19	63.7		4/28/10 12:32	60.1
S201877-AT_C.1	4/28/10 10:05	64.9		4/28/10 11:20	64.3		4/28/10 12:33	59.7
S201877-AT_C.1	4/28/10 10:06	64.7		4/28/10 11:21	65		4/28/10 12:34	59.3
S201877-AT_C.1	4/28/10 10:07	64.4		4/28/10 11:22	65.9		4/28/10 12:35	58.9
S201877-AT_C.1	4/28/10 10:08	64.2		4/28/10 11:23	66.8		4/28/10 12:36	58.5
S201877-AT_C.1	4/28/10 10:09	63.9		4/28/10 11:24	67.3		4/28/10 12:37	58.1
S201877-AT_C.1	4/28/10 10:10	63.7		4/28/10 11:25	67.4		4/28/10 12:38	57.7
S201877-AT_C.1	4/28/10 10:11	63.4		4/28/10 11:26	67.4		4/28/10 12:39	57.2
S201877-AT_C.1	4/28/10 10:12	63.2		4/28/10 11:27	67.5		4/28/10 12:40	56.8
S201877-AT_C.1	4/28/10 10:13	63.3		4/28/10 11:28	67.5		4/28/10 12:41	56.4
S201877-AT_C.1	4/28/10 10:14	63.3		4/28/10 11:29	67.5		4/28/10 12:42	55.9
S201877-AT_C.1	4/28/10 10:15	63.3		4/28/10 11:30	67.6		4/28/10 12:43	55.8
S201877-AT_C.1	4/28/10 10:16	63.3		4/28/10 11:31	67.6		4/28/10 12:44	56.1
S201877-AT_C.1	4/28/10 10:17	63.3		4/28/10 11:32	68.3		4/28/10 12:45	56.5
S201877-AT_C.1	4/28/10 10:18	63.3		4/28/10 11:33	70.4		4/28/10 12:46	60.2
S201877-AT_C.1	4/28/10 10:19	63.4		4/28/10 11:34	72.4		4/28/10 12:47	80.4
S201877-AT_C.1	4/28/10 10:20	62.7		4/28/10 11:35	74.5		4/28/10 13:09	70.7
S201877-AT_C.1	4/28/10 10:21	60.8		4/28/10 11:36	76.6		4/28/10 13:10	67.1
S201877-AT_C.1	4/28/10 10:22	60.4		4/28/10 11:37	78.4		4/28/10 13:11	63.5
S201877-AT_C.1	4/28/10 10:23	63.2		4/28/10 11:38	80		4/28/10 13:12	59.9
S201877-AT_C.1	4/28/10 10:24	65.2		4/28/10 11:39	80.6		4/28/10 13:13	57.1
S201877-AT_C.1	4/28/10 10:25	65.6		4/28/10 11:40	79.7		4/28/10 13:14	56
S201877-AT_C.1	4/28/10 10:26	66		4/28/10 11:41	78.8		4/28/10 13:15	54.9
S201877-AT_C.1	4/28/10 10:27	68.4		4/28/10 11:42	77.9		4/28/10 13:16	53.7
S201877-AT_C.1	4/28/10 10:28	72.2		4/28/10 11:43	76.9		4/28/10 13:17	52.6
S201877-AT_C.1	4/28/10 10:29	71.2		4/28/10 11:44	75.5		4/28/10 13:18	51.8
S201877-AT_C.1	4/28/10 10:30	70.1		4/28/10 11:45	73.3		4/28/10 13:19	51.5
S201877-AT_C.1	4/28/10 10:31	69.4		4/28/10 11:46	71		4/28/10 13:20	51.3
S201877-AT_C.1	4/28/10 10:32	69.4		4/28/10 11:47	69.2		4/28/10 13:21	51.1
S201877-AT_C.1	4/28/10 10:33	69.4		4/28/10 11:48	68.3		4/28/10 13:22	50.8
S201877-AT_C.1	4/28/10 10:34	69.5		4/28/10 11:49	67.5		4/28/10 13:23	50.6
S201877-AT_C.1	4/28/10 10:35	69.5		4/28/10 11:50	66.9		4/28/10 13:24	50.3
S201877-AT_C.1	4/28/10 10:36	69.5		4/28/10 11:51	66.8		4/28/10 13:25	49.7
S201877-AT_C.1	4/28/10 10:37	69.6		4/28/10 11:52	66.7		4/28/10 13:26	48.5
S201877-AT_C.1	4/28/10 10:38	69.6		4/28/10 11:53	66.6		4/28/10 13:27	47.7
S201877-AT_C.1	4/28/10 10:39	69.7		4/28/10 11:54	67.2		4/28/10 13:28	48.1
S201877-AT_C.1	4/28/10 10:40	69.7		4/28/10 11:55	69.2		4/28/10 13:29	48.4
S201877-AT_C.1	4/28/10 10:41	70		4/28/10 11:56	70.8		4/28/10 13:30	48.8
S201877-AT_C.1	4/28/10 10:42	70.8		4/28/10 11:57	71.9		4/28/10 13:31	49.1
S201877-AT_C.1	4/28/10 10:43	71.6		4/28/10 11:58	73		4/28/10 13:32	49.5
S201877-AT_C.1	4/28/10 10:44	72.4		4/28/10 11:59	74.2		4/28/10 13:33	49.7
S201877-AT_C.1	4/28/10 10:45	73.2		4/28/10 12:00	74.9		4/28/10 13:34	49.7
S201877-AT_C.1	4/28/10 10:46	74		4/28/10 12:01	74.4		4/28/10 13:35	49.7
S201877-AT_C.1	4/28/10 10:47	74.8		4/28/10 12:02	73.9		4/28/10 13:36	49.6
S201877-AT_C.1	4/28/10 10:48	75.6		4/28/10 12:03	73		4/28/10 13:37	49.6
S201877-AT_C.1	4/28/10 10:49	76.4		4/28/10 12:04	71.5		4/28/10 13:38	49.6
S201877-AT_C.1	4/28/10 10:50	76.4		4/28/10 12:05	70.1		4/28/10 13:39	50
S201877-AT_C.1	4/28/10 10:51	75.2		4/28/10 12:06	68.7		4/28/10 13:40	50.1
S201877-AT_C.1	4/28/10 10:52	74.3		4/28/10 12:07	67.4		4/28/10 13:41	50.1
S201877-AT_C.1	4/28/10 10:53	73.8		4/28/10 12:08	66.1		4/28/10 13:42	50.2
S201877-AT_C.1	4/28/10 10:54	73.3		4/28/10 12:09	64		4/28/10 13:43	50.2
S201877-AT_C.1	4/28/10 10:55	72.8		4/28/10 12:10	62.3		4/28/10 13:44	50.2
S201877-AT_C.1	4/28/10 10:56	72.4		4/28/10 12:11	63.6		4/28/10 13:45	50.2
S201877-AT_C.1	4/28/10 10:57	71.9		4/28/10 12:12	65.1		4/28/10 13:46	50.2
S201877-AT_C.1	4/28/10 10:58	71.4		4/28/10 12:13	66.5		4/28/10 13:47	50.2
S201877-AT_C.1	4/28/10 10:59	69.4		4/28/10 12:14	67.9		4/28/10 13:48	50.2
S201877-AT_C.1	4/28/10 11:00	66.7		4/28/10 12:15	69.4		4/28/10 13:49	50.2
S201877-AT_C.1	4/28/10 11:01	68.6		4/28/10 12:16	70.2		4/28/10 13:50	50.2
S201877-AT_C.1	4/28/10 11:02	72.4					4/28/10 13:51	50.2

O2									
tag	time	1m avg		time	1m avg		time	1m avg
S201877-AT_D.1	4/28/10 9:58	5.5		4/28/10 11:13	5.3		4/28/10 12:26	5.2
S201877-AT_D.1	4/28/10 9:59	5.5		4/28/10 11:14	5.3		4/28/10 12:27	5.2
S201877-AT_D.1	4/28/10 10:00	5.5		4/28/10 11:15	5.3		4/28/10 12:28	5.2
S201877-AT_D.1	4/28/10 10:01	5.5		4/28/10 11:16	5.3		4/28/10 12:29	5.2
S201877-AT_D.1	4/28/10 10:02	5.5		4/28/10 11:17	5.3		4/28/10 12:30	5.2
S201877-AT_D.1	4/28/10 10:03	5.5		4/28/10 11:18	5.3		4/28/10 12:31	5.2
S201877-AT_D.1	4/28/10 10:04	5.5		4/28/10 11:19	5.3		4/28/10 12:32	5.2
S201877-AT_D.1	4/28/10 10:05	5.4		4/28/10 11:20	5.3		4/28/10 12:33	5.1
S201877-AT_D.1	4/28/10 10:06	5.4		4/28/10 11:21	5.3		4/28/10 12:34	5.1
S201877-AT_D.1	4/28/10 10:07	5.4		4/28/10 11:22	5.3		4/28/10 12:35	5.1
S201877-AT_D.1	4/28/10 10:08	5.4		4/28/10 11:23	5.3		4/28/10 12:36	5.1
S201877-AT_D.1	4/28/10 10:09	5.4		4/28/10 11:24	5.3		4/28/10 12:37	5.1
S201877-AT_D.1	4/28/10 10:10	5.4		4/28/10 11:25	5.3		4/28/10 12:38	5.1
S201877-AT_D.1	4/28/10 10:11	5.4		4/28/10 11:26	5.3		4/28/10 12:39	5.1
S201877-AT_D.1	4/28/10 10:12	5.4		4/28/10 11:27	5.3		4/28/10 12:40	5.1
S201877-AT_D.1	4/28/10 10:13	5.4		4/28/10 11:28	5.3		4/28/10 12:41	5.1
S201877-AT_D.1	4/28/10 10:14	5.4		4/28/10 11:29	5.3		4/28/10 12:42	5.1
S201877-AT_D.1	4/28/10 10:15	5.4		4/28/10 11:30	5.3		4/28/10 12:43	5.1
S201877-AT_D.1	4/28/10 10:16	5.4		4/28/10 11:31	5.3		4/28/10 12:44	5
S201877-AT_D.1	4/28/10 10:17	5.4		4/28/10 11:32	5.3		4/28/10 12:45	5
S201877-AT_D.1	4/28/10 10:18	5.4		4/28/10 11:33	5.3		4/28/10 12:46	5
S201877-AT_D.1	4/28/10 10:19	5.4		4/28/10 11:34	5.3		4/28/10 12:47	5
S201877-AT_D.1	4/28/10 10:20	5.4		4/28/10 11:35	5.3		4/28/10 13:09	4.8
S201877-AT_D.1	4/28/10 10:21	5.4		4/28/10 11:36	5.3		4/28/10 13:10	4.8
S201877-AT_D.1	4/28/10 10:22	5.4		4/28/10 11:37	5.3		4/28/10 13:11	4.8
S201877-AT_D.1	4/28/10 10:23	5.4		4/28/10 11:38	5.3		4/28/10 13:12	4.8
S201877-AT_D.1	4/28/10 10:24	5.4		4/28/10 11:39	5.3		4/28/10 13:13	4.8
S201877-AT_D.1	4/28/10 10:25	5.4		4/28/10 11:40	5.3		4/28/10 13:14	4.8
S201877-AT_D.1	4/28/10 10:26	5.4		4/28/10 11:41	5.3		4/28/10 13:15	4.8
S201877-AT_D.1	4/28/10 10:27	5.4		4/28/10 11:42	5.3		4/28/10 13:16	4.8
S201877-AT_D.1	4/28/10 10:28	5.4		4/28/10 11:43	5.3		4/28/10 13:17	4.8
S201877-AT_D.1	4/28/10 10:29	5.4		4/28/10 11:44	5.3		4/28/10 13:18	4.8
S201877-AT_D.1	4/28/10 10:30	5.4		4/28/10 11:45	5.3		4/28/10 13:19	4.8
S201877-AT_D.1	4/28/10 10:31	5.4		4/28/10 11:46	5.3		4/28/10 13:20	4.8
S201877-AT_D.1	4/28/10 10:32	5.4		4/28/10 11:47	5.3		4/28/10 13:21	4.8
S201877-AT_D.1	4/28/10 10:33	5.4		4/28/10 11:48	5.3		4/28/10 13:22	4.9
S201877-AT_D.1	4/28/10 10:34	5.4		4/28/10 11:49	5.3		4/28/10 13:23	4.9
S201877-AT_D.1	4/28/10 10:35	5.4		4/28/10 11:50	5.3		4/28/10 13:24	4.9
S201877-AT_D.1	4/28/10 10:36	5.4		4/28/10 11:51	5.3		4/28/10 13:25	4.9
S201877-AT_D.1	4/28/10 10:37	5.4		4/28/10 11:52	5.3		4/28/10 13:26	4.9
S201877-AT_D.1	4/28/10 10:38	5.4		4/28/10 11:53	5.3		4/28/10 13:27	4.9
S201877-AT_D.1	4/28/10 10:39	5.4		4/28/10 11:54	5.3		4/28/10 13:28	4.9
S201877-AT_D.1	4/28/10 10:40	5.4		4/28/10 11:55	5.3		4/28/10 13:29	5
S201877-AT_D.1	4/28/10 10:41	5.4		4/28/10 11:56	5.3		4/28/10 13:30	5
S201877-AT_D.1	4/28/10 10:42	5.4		4/28/10 11:57	5.3		4/28/10 13:31	5
S201877-AT_D.1	4/28/10 10:43	5.4		4/28/10 11:58	5.3		4/28/10 13:32	5
S201877-AT_D.1	4/28/10 10:44	5.4		4/28/10 11:59	5.3		4/28/10 13:33	5
S201877-AT_D.1	4/28/10 10:45	5.4		4/28/10 12:00	5.3		4/28/10 13:34	5
S201877-AT_D.1	4/28/10 10:46	5.4		4/28/10 12:01	5.3		4/28/10 13:35	5
S201877-AT_D.1	4/28/10 10:47	5.4		4/28/10 12:02	5.3		4/28/10 13:36	5
S201877-AT_D.1	4/28/10 10:48	5.4		4/28/10 12:03	5.3		4/28/10 13:37	5.1
S201877-AT_D.1	4/28/10 10:49	5.4		4/28/10 12:04	5.3		4/28/10 13:38	5.1
S201877-AT_D.1	4/28/10 10:50	5.4		4/28/10 12:05	5.3		4/28/10 13:39	5
S201877-AT_D.1	4/28/10 10:51	5.4		4/28/10 12:06	5.3		4/28/10 13:40	5
S201877-AT_D.1	4/28/10 10:52	5.4		4/28/10 12:07	5.3		4/28/10 13:41	5
S201877-AT_D.1	4/28/10 10:53	5.4		4/28/10 12:08	5.3		4/28/10 13:42	5
S201877-AT_D.1	4/28/10 10:54	5.4		4/28/10 12:09	5.3		4/28/10 13:43	5
S201877-AT_D.1	4/28/10 10:55	5.4		4/28/10 12:10	5.3		4/28/10 13:44	5
S201877-AT_D.1	4/28/10 10:56	5.4		4/28/10 12:11	5.3		4/28/10 13:45	5
S201877-AT_D.1	4/28/10 10:57	5.4		4/28/10 12:12	5.3		4/28/10 13:46	5
S201877-AT_D.1	4/28/10 10:58	5.4		4/28/10 12:13	5.3		4/28/10 13:47	5
S201877-AT_D.1	4/28/10 10:59	5.4		4/28/10 12:14	5.3		4/28/10 13:48	5
S201877-AT_D.1	4/28/10 11:00	5.4		4/28/10 12:15	5.3		4/28/10 13:49	5.1
S201877-AT_D.1	4/28/10 11:01	5.4		4/28/10 12:16	5.3		4/28/10 13:50	5.1
S201877-AT_D.1	4/28/10 11:02	5.4					4/28/10 13:51	5.1

SO2 (Uncompensated)								
tag	time	1m avg		time	1m avg		time	1m avg
S201877-AT_A.1	4/28/10 9:58	45.5		4/28/10 11:13	48		4/28/10 12:26	43.9
S201877-AT_A.1	4/28/10 9:59	45.6		4/28/10 11:14	47.5		4/28/10 12:27	43.8
S201877-AT_A.1	4/28/10 10:00	45.7		4/28/10 11:15	47.1		4/28/10 12:28	43.6
S201877-AT_A.1	4/28/10 10:01	45.8		4/28/10 11:16	46.6		4/28/10 12:29	43.5
S201877-AT_A.1	4/28/10 10:02	45.9		4/28/10 11:17	46.2		4/28/10 12:30	43.4
S201877-AT_A.1	4/28/10 10:03	45.9		4/28/10 11:18	46		4/28/10 12:31	43.2
S201877-AT_A.1	4/28/10 10:04	46		4/28/10 11:19	46.4		4/28/10 12:32	43.1
S201877-AT_A.1	4/28/10 10:05	46.1		4/28/10 11:20	46.8		4/28/10 12:33	42.8
S201877-AT_A.1	4/28/10 10:06	46.1		4/28/10 11:21	47.2		4/28/10 12:34	42.6
S201877-AT_A.1	4/28/10 10:07	46.2		4/28/10 11:22	47.6		4/28/10 12:35	42.4
S201877-AT_A.1	4/28/10 10:08	46.3		4/28/10 11:23	48		4/28/10 12:36	42.1
S201877-AT_A.1	4/28/10 10:09	46.3		4/28/10 11:24	48.4		4/28/10 12:37	41.9
S201877-AT_A.1	4/28/10 10:10	46.1		4/28/10 11:25	48.8		4/28/10 12:38	41.7
S201877-AT_A.1	4/28/10 10:11	46		4/28/10 11:26	49.2		4/28/10 12:39	41.5
S201877-AT_A.1	4/28/10 10:12	45.9		4/28/10 11:27	49.7		4/28/10 12:40	41.2
S201877-AT_A.1	4/28/10 10:13	45.7		4/28/10 11:28	50.2		4/28/10 12:41	41
S201877-AT_A.1	4/28/10 10:14	45.6		4/28/10 11:29	50.7		4/28/10 12:42	40.9
S201877-AT_A.1	4/28/10 10:15	45.5		4/28/10 11:30	51.2		4/28/10 12:43	41.1
S201877-AT_A.1	4/28/10 10:16	45.3		4/28/10 11:31	51.7		4/28/10 12:44	41.2
S201877-AT_A.1	4/28/10 10:17	45.2		4/28/10 11:32	52.2		4/28/10 12:45	41.4
S201877-AT_A.1	4/28/10 10:18	45.2		4/28/10 11:33	52.7		4/28/10 12:46	44.1
S201877-AT_A.1	4/28/10 10:19	45.4		4/28/10 11:34	53.2		4/28/10 12:47	58.7
S201877-AT_A.1	4/28/10 10:20	45.7		4/28/10 11:35	53.7		4/28/10 13:09	52.3
S201877-AT_A.1	4/28/10 10:21	45.9		4/28/10 11:36	53.9		4/28/10 13:10	49.3
S201877-AT_A.1	4/28/10 10:22	46.2		4/28/10 11:37	53.7		4/28/10 13:11	47.6
S201877-AT_A.1	4/28/10 10:23	46.4		4/28/10 11:38	53.4		4/28/10 13:12	46
S201877-AT_A.1	4/28/10 10:24	46.7		4/28/10 11:39	53.1		4/28/10 13:13	44.4
S201877-AT_A.1	4/28/10 10:25	47		4/28/10 11:40	52.9		4/28/10 13:14	42.8
S201877-AT_A.1	4/28/10 10:26	47.2		4/28/10 11:41	52.6		4/28/10 13:15	41.2
S201877-AT_A.1	4/28/10 10:27	47.4		4/28/10 11:42	52.3		4/28/10 13:16	39.5
S201877-AT_A.1	4/28/10 10:28	47.7		4/28/10 11:43	52.1		4/28/10 13:17	38.4
S201877-AT_A.1	4/28/10 10:29	47.9		4/28/10 11:44	51.8		4/28/10 13:18	38.1
S201877-AT_A.1	4/28/10 10:30	48.1		4/28/10 11:45	51.4		4/28/10 13:19	37.8
S201877-AT_A.1	4/28/10 10:31	48.3		4/28/10 11:46	50.7		4/28/10 13:20	37.6
S201877-AT_A.1	4/28/10 10:32	48.5		4/28/10 11:47	50.1		4/28/10 13:21	37.3
S201877-AT_A.1	4/28/10 10:33	48.7		4/28/10 11:48	49.5		4/28/10 13:22	37
S201877-AT_A.1	4/28/10 10:34	49		4/28/10 11:49	48.8		4/28/10 13:23	36.8
S201877-AT_A.1	4/28/10 10:35	49.2		4/28/10 11:50	48.2		4/28/10 13:24	36.5
S201877-AT_A.1	4/28/10 10:36	49.4		4/28/10 11:51	47.5		4/28/10 13:25	36.2
S201877-AT_A.1	4/28/10 10:37	49.7		4/28/10 11:52	46.9		4/28/10 13:26	36.1
S201877-AT_A.1	4/28/10 10:38	49.9		4/28/10 11:53	46.7		4/28/10 13:27	36.3
S201877-AT_A.1	4/28/10 10:39	50.2		4/28/10 11:54	47.2		4/28/10 13:28	36.5
S201877-AT_A.1	4/28/10 10:40	50.4		4/28/10 11:55	47.8		4/28/10 13:29	36.7
S201877-AT_A.1	4/28/10 10:41	50.7		4/28/10 11:56	48.4		4/28/10 13:30	36.9
S201877-AT_A.1	4/28/10 10:42	50.9		4/28/10 11:57	49		4/28/10 13:31	37.1
S201877-AT_A.1	4/28/10 10:43	51.2		4/28/10 11:58	49.6		4/28/10 13:32	37.3
S201877-AT_A.1	4/28/10 10:44	51.4		4/28/10 11:59	50.2		4/28/10 13:33	37.5
S201877-AT_A.1	4/28/10 10:45	51.6		4/28/10 12:00	50.8		4/28/10 13:34	37.7
S201877-AT_A.1	4/28/10 10:46	51.6		4/28/10 12:01	51.4		4/28/10 13:35	37.7
S201877-AT_A.1	4/28/10 10:47	51.6		4/28/10 12:02	52		4/28/10 13:36	37.2
S201877-AT_A.1	4/28/10 10:48	51.5		4/28/10 12:03	51.9		4/28/10 13:37	36.8
S201877-AT_A.1	4/28/10 10:49	51.5		4/28/10 12:04	50.7		4/28/10 13:38	36.3
S201877-AT_A.1	4/28/10 10:50	51.5		4/28/10 12:05	49.5		4/28/10 13:39	37.6
S201877-AT_A.1	4/28/10 10:51	51.5		4/28/10 12:06	48.3		4/28/10 13:40	37.5
S201877-AT_A.1	4/28/10 10:52	51.5		4/28/10 12:07	47		4/28/10 13:41	37.5
S201877-AT_A.1	4/28/10 10:53	51.5		4/28/10 12:08	45.8		4/28/10 13:42	37.4
S201877-AT_A.1	4/28/10 10:54	51.4		4/28/10 12:09	44.6		4/28/10 13:43	37.3
S201877-AT_A.1	4/28/10 10:55	51.4		4/28/10 12:10	44.1		4/28/10 13:44	37.3
S201877-AT_A.1	4/28/10 10:56	51.3		4/28/10 12:11	44.9		4/28/10 13:45	37.2
S201877-AT_A.1	4/28/10 10:57	51.2		4/28/10 12:12	45.7		4/28/10 13:46	37
S201877-AT_A.1	4/28/10 10:58	51.1		4/28/10 12:13	46.6		4/28/10 13:47	36.8
S201877-AT_A.1	4/28/10 10:59	51.1		4/28/10 12:14	47.5		4/28/10 13:48	36.6
S201877-AT_A.1	4/28/10 11:00	51		4/28/10 12:15	48.3		4/28/10 13:49	36.4
S201877-AT_A.1	4/28/10 11:01	50.9		4/28/10 12:16	49.2		4/28/10 13:50	36.3
S201877-AT_A.1	4/28/10 11:02	53.3					4/28/10 13:51	36.1

APPENDIX E SAMPLE CALCULATIONS

SAMPLE CALCULATIONS, RUN 1
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
4/27/2010

Absolute Stack Pressure (inches Mercury)

$$P_S = P_{bar} + \frac{\overline{P_g}}{13.6}$$

P_g = Stack Static Pressure (inches Water) = -0.45
P_{bar} = Barometric Pressure (inches Mercury) = 29.80
P_s = 29.77

Absolute Pressure at the Dry Gas Meter (inches Mercury)

$$P_m = P_{bar} + \frac{\overline{\Delta H}}{13.6}$$

P_{bar} = Barometric Pressure (inches Mercury) = 29.80
ΔH = Average pressure difference of orifice (inches Water) = 1.50
P_m = 29.91

Average Stack Gas Velocity (feet per second)

$$V_s = K_p C_p \overline{\sqrt{\Delta P}} \sqrt{\frac{\overline{T_s}}{M_s P_s}}$$

$$Kp = \text{Pitot tube constant} \sqrt{\frac{(\text{lb/lb - mole})\ (\text{inches Hg})}{(°\text{R})\ (\text{inches H2O})}} = 85.49$$

C_p = Pitot tube coefficient (dimensionless) = 0.84
$\overline{\sqrt{\Delta P}}$ = Velocity head of stack gas (inches H2O) = 0.2773
Ts = Average absolute temperature of stack, degrees Rankin = 1,005.3
M_s = Molecular weight of stack gas; wet basis (lb/lb mole) = 27.69
P_s = Absolute stack pressure (inches Mercury) = 29.77
V_s = 22.0

Volume of Gas Sampled Measured by Dry Gas Meter

(corrected to standard conditions, SDCF)

$$Vm(Std) = K_1 V_m Y \left[\frac{P_{bar} + \frac{\overline{\Delta H}}{13.6}}{\overline{T_m}} \right]$$

K_1 = Degrees R/inches Mercury	=	17.64
V_m = Volume of gas sample as measured by dry gas meter (actual cubic feet)	=	40.81
Y = Dry gas meter calibration factor (dimensionless)	=	0.9740
P_{bar} = Barometric Pressure (inches Mercury)	=	29.80
Δ H = Average pressure difference of orifice (inches H2O)	=	1.50
T_m = Average absolute temperature of the dry gas, degrees Rankin	=	521.8
$V_{m\,(Std)}$	=	40.182

Volume of Water Vapor in Gas Sample

(corrected to standard conditions, SDCF)

$$V_{w\,(Std)} = 0.04707\ V_{lc}$$

V_{lc} = Total volume of liquid collected in impingers and silica gel (milliliters)	=	54.4
$V_{w\,(Std)}$	=	2.561

Water Vapor in the Gas Stream **proportion by volume (dimensionless)**

$$B_{ws} = \frac{V_{w(Std)}}{V_{m(Std)} + V_{w(Std)}}$$

$V_{w\,(std)}$ = Volume of water in gas sample (corrected to standard conditions)	=	2.561
$V_{m(std)}$ = Volume of sample measured by dry gas meter (standard conditions)	=	40.182
B_{ws}	=	0.060

Molecular Weight of Stack Gas **(dry basis, lb/lb mole)**

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2 + \%CO)$$

$\%CO_2$ = Number percent by volume (dry basis from gas analysis)	=	0.5
$\%O_2$ = Number percent by volume (dry basis from gas analysis)	=	5.7
$\%N_2$+%CO = Number percent by volume (dry basis from gas analysis)	=	93.8
M_d	=	28.31

Molecular Weight of Stack Gas (wet basis, lb/lb mole)

$$M_s = M_d(1 - B_{ws}) + 18(B_{ws})$$

M_d = Molecular weight of stack gas (dry basis, lb/lb mole) = 28.31
B_{ws} = Water vapor in the gas stream (proportion by volume, dimensionless) = 0.060
M_s = 27.69

Volumetric Flow Rate (actual cubic feet per minute)

$$Q_a = (V_s)(A_s)(60)$$

V_s = Average stack gas velocity (feet per second) = 22.0
A_s = Cross sectional area of stack (feet squared) = 5.5851
Q_a = 7,369

Volumetric Flow Rate (standard dry cubic feet per minute)

$$Q_s = Q_a(1 - B_{ws}) \frac{(528)}{\overline{T_s}} \frac{(P_s)}{29.92}$$

Q_a = Volumetric flow rate (actual cubic feet per minute) = 7,369
B_{ws} = Water vapor in the gas stream (proportion by volume, dimensionless) = 0.060
Ts = Average absolute temperature of stack, degrees Rankin = 1,005.3
P_s = Absolute stack pressure (inches Mercury) = 29.77
Q_s = 3,618

Volumetric Flow Rate (standard wet cubic feet per minute)

$$Q_{sw} = Q_a \frac{(528)}{\overline{T_s}} \frac{(P_s)}{29.92}$$

Q_a = Volumetric flow rate (actual cubic feet per minute) = 7,369
Ts = Average absolute temperature of stack, degrees Rankin = 1,005.3
P_s = Absolute stack pressure (inches Mercury) = 29.77
Q_{sw} = 3,848

Nitrogen Oxides Emission Rate in Pounds per Hour

$$E_{lb/hour\ x} \square \frac{MW_x}{385,000,000} C_{ppm_x} Q_{std} 60$$

x = Compound of interest (SO2 NOx CO VOC TRS etc) =	NOx
MWx = Molecular weight of compound (dry basis, lb/lb mole) =	46.01
Cppmx = Pollutant Concentration (parts per million, dry basis) =	4.9
Qstd = Volumetric flow rate (standard dry cubic feet per minute) =	3,618
$E_{lb/hour}$ =	0.13

SAMPLE CALCULATIONS, RUN 1
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
4/28/2010

Sulfur Dioxide Concentration (adjusted to 0% Oxygen)

$$C_{ppmx0\%O2} = C_{ppmx} \left(\frac{20.9 - 0.0}{20.9 - \%O_2} \right)$$

x = Compound of interest (SO2 NOx CO VOC TRS etc) =	SO2
Cppmx = Pollutant Concentration (parts per million, dry basis) =	55.0
$\%O_2$ = Number percent by volume (dry basis from gas analysis) =	7.4
$C_{ppmx0\%O2}$ =	84.9

APPENDIX F SULFUR DIOXIDE RATA AND COMPLIANCE
APRIL 27, 2010

SULFUR DIOXIDE RELATIVE ACCURACY TEST AUDIT
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

USE	RUN	START TIME Military	STOP TIME Military	*Reference Method* Sulfur Dioxide Concentration Corrected to 0% O2 (ppm-dry)	*Pollutant Monitor* Sulfur Dioxide Concentration Corrected to 0% O2 (ppm-dry)	Difference
Y	RUN 1	7:14	7:35	77.4	40.9	36.5
Y	RUN 2	7:35	7:56	73.4	40.4	33.0
Y	RUN 3	7:56	8:17	70.0	41.3	28.7
Y	RUN 4	8:30	8:51	72.2	42.3	29.9
Y	RUN 5	8:51	9:12	67.0	41.5	25.5
Y	RUN 6	9:12	9:33	66.1	41.2	24.9
Y	RUN 7	9:45	10:06	76.6	44.5	32.1
Y	RUN 8	10:06	10:27	73.8	43.9	30.0
Y	RUN 9	10:27	10:48	74.3	44.4	29.8

STD = Emission Standard = 250

$$\text{Average Difference} = \bar{d} = \frac{1}{N}\sum_{i=1}^{N} d_i = \quad 30.036$$

$$\text{Reference Method Average} = \overline{\text{RM}} = \frac{1}{N}\sum_{i=1}^{N} RM_i = \quad 72.304$$

$$\text{Pollutant Monitor Average} = \text{PR}_{\text{ave}} = \frac{1}{N}\sum_{i=1}^{N} \text{PR}_i = \quad 42.268$$

$$\text{Standard Deviation} = S_d = \sqrt{\frac{1}{N-1}\left\{\sum_{i=1}^{n} d_i^{\,2} - n\bar{d}^{\,2}\right\}} = \quad 3.578$$

$$\text{Confidence Coefficient} = |cc| = t_{0.975}\frac{S_d}{\sqrt{N}} = \quad 2.750$$

$$\text{Relative Accuracy} = \frac{|\bar{d}| + |cc|}{\text{STD.}} \times 100 = \quad 13.114$$

Allowable = 10.000

SULFUR DIOXIDE RATA EMISSIONS TEST RESULTS
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

TEST	Start Time Military	Stop Time Military	Oxygen (Dry) (measured) (Percent)	Sulfur Dioxide Emissions (ppm-dry)	Sulfur Dioxide Concentration Corrected to 0.0% O2 (ppm-dry)
RUN 1	7:14	7:35	5.7	56.2	77.4
RUN 2	7:35	7:56	5.7	53.3	73.4
RUN 3	7:56	8:17	5.7	50.8	70.0
RUN 4	8:30	8:51	5.7	52.5	72.2
RUN 5	8:51	9:12	5.7	48.7	67.0
RUN 6	9:12	9:33	5.7	48.1	66.1
RUN 7	9:45	10:06	5.7	55.8	76.6
RUN 8	10:06	10:27	5.7	53.8	73.8
RUN 9	10:27	10:48	5.7	54.1	74.3
Average			**5.7**	**52.6**	**72.3**

SULFUR DIOXIDE COMPLIANCE EMISSIONS TEST RESULTS
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

TEST	Start Time Military	Stop Time Military	Oxygen (Dry) (measured) (Percent)	Sulfur Dioxide Emissions (ppm-dry)	Sulfur Dioxide Concentration Corrected to 0.0% O2 (ppm-dry)
RUN 1	7:14	8:17	5.7	53.4	73.6
RUN 2	8:30	9:33	5.7	49.8	68.4
RUN 3	9:45	10:48	5.7	54.6	74.9
Average			5.7	52.6	72.3
Allowable					250

OXYGEN TESTING QUALITY ASSURANCE
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

Analyzer Calibration Data

INITIAL ANALYZER SPAN (Percent) =		21	ANALYZER ID.	OXYGEN
	CYLINDER VALUE Percent	ANALYZER RESPONSE (Percent)	DIFFERENCE (Percent)	DIFFERENCE % SPAN (ALLOWED 2%)
Zero Gas	0.00	0.00	0.0	0.0
High Range Gas	20.90	20.90	0.0	0.0
Mid Range Gas	10.60	10.60	0.0	0.0

Test Results & Analyzer Calibration Bias and Drift Data

data & calculation entry						
START TIME OF RUN	STOP TIME OF RUN	RUN #	ANALYZER STACK GAS CONCENTRATION UNCORRECTED (Percent)	SYSTEM ZERO (Percent)	SYSTEM UPSCALE (Percent)	CYLINDER CONCENTRATION UPSCALE CALIBRATION GAS (Percent)
			INITIAL SYSTEM	0.10	10.70	
7:14	7:35	RUN 1	5.80	0.00	10.70	10.6
7:35	7:56	RUN 2	5.80	0.00	10.70	10.6
7:56	8:17	RUN 3	5.80	0.00	10.70	10.6
8:30	8:51	RUN 4	5.70	0.00	10.50	10.6
8:51	9:12	RUN 5	5.70	0.00	10.50	10.6
9:12	9:33	RUN 6	5.70	0.00	10.50	10.6
9:45	10:06	RUN 7	5.70	0.00	10.80	10.6
10:06	10:27	RUN 8	5.70	0.00	10.80	10.6
10:27	10:48	RUN 9	5.70	0.00	10.80	10.6

system zero bias & drift			system upscale bias & drift			test results	RUN #
INITIAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	ZERO DRIFT % SPAN (ALLOWED 3%)	INITIAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	UPSCALE DRIFT % SPAN (ALLOWED 3%)	OXYGEN CONCENTRATION (Percent-Dry)	
0.48	0.00	-0.48	0.48	0.48	0.0	**5.7**	RUN 1
0.48	0.00	-0.48	0.48	0.48	0.0	**5.7**	RUN 2
0.48	0.00	-0.48	0.48	0.48	0.0	**5.7**	RUN 3
0.00	0.00	0.00	0.48	-0.48	-1.0	**5.7**	RUN 4
0.00	0.00	0.00	0.48	-0.48	-1.0	**5.7**	RUN 5
0.00	0.00	0.00	0.48	-0.48	-1.0	**5.7**	RUN 6
0.00	0.00	0.00	-0.48	0.96	1.4	**5.7**	RUN 7
0.00	0.00	0.00	-0.48	0.96	1.4	**5.7**	RUN 8
0.00	0.00	0.00	-0.48	0.96	1.4	**5.7**	RUN 9

SULFUR DIOXIDE TESTING QUALITY ASSURANCE
HUNT REFINING COMPANY
NO. 2 SULFUR RECOVERY UNIT
Tuesday, April 27, 2010

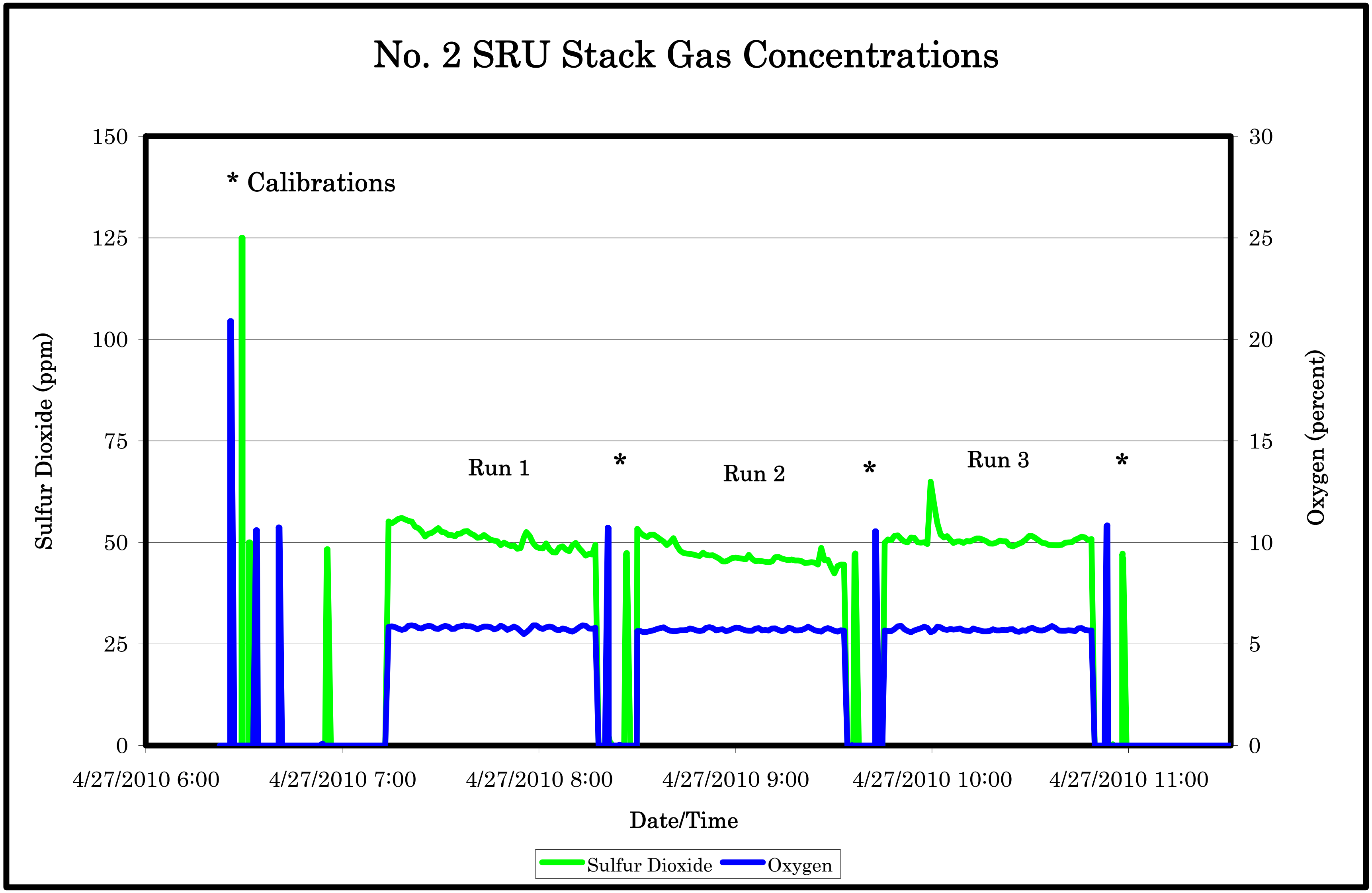
Analyzer Calibration Data

INITIAL ANALYZER SPAN (PPM) =		125	ANALYZER ID.	SULFUR DIOXIDE
	CYLINDER VALUE PPM	ANALYZER RESPONSE (PPM)	DIFFERENCE (PPM)	DIFFERENCE % SPAN (ALLOWED 2%)
Zero Gas	0.00	0.00	0.0	0.0
High Range Gas	125.00	125.00	0.0	0.0
Mid Range Gas	50.03	50.00	0.0	0.0

Test Results & Analyzer Calibration Bias and Drift Data

data & calculation entry						
START TIME OF RUN	STOP TIME OF RUN	RUN #	ANALYZER STACK GAS CONCENTRATION UNCORRECTED (PPM)	SYSTEM ZERO (PPM)	SYSTEM UPSCALE (PPM)	CYLINDER CONCENTRATION UPSCALE CALIBRATION GAS (PPM)
			INITIAL SYSTEM	0.30	48.30	
7:14	7:35	RUN 1	53.50	1.50	47.20	50.03
7:35	7:56	RUN 2	50.80	1.50	47.20	50.03
7:56	8:17	RUN 3	48.50	1.50	47.20	50.03
8:30	8:51	RUN 4	49.40	-0.40	47.00	50.03
8:51	9:12	RUN 5	45.90	-0.40	47.00	50.03
9:12	9:33	RUN 6	45.30	-0.40	47.00	50.03
9:45	10:06	RUN 7	52.00	0.10	46.20	50.03
10:06	10:27	RUN 8	50.10	0.10	46.20	50.03
10:27	10:48	RUN 9	50.40	0.10	46.20	50.03

system zero bias & drift			system upscale bias & drift			test results	RUN #
INITIAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM ZERO CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	ZERO DRIFT % SPAN (ALLOWED 3%)	INITIAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	FINAL SYSTEM UPSCALE CAL. BIAS RESPONSE % SPAN (ALLOWED 5%)	UPSCALE DRIFT % SPAN (ALLOWED 3%)	SULFUR DIOXIDE CONCENTRATION (PPM-Dry)	
0.24	1.20	0.96	-1.36	-2.24	-0.9	**56.2**	RUN 1
0.24	1.20	0.96	-1.36	-2.24	-0.9	**53.3**	RUN 2
0.24	1.20	0.96	-1.36	-2.24	-0.9	**50.8**	RUN 3
1.20	-0.32	-1.52	-2.24	-2.40	-0.2	**52.5**	RUN 4
1.20	-0.32	-1.52	-2.24	-2.40	-0.2	**48.7**	RUN 5
1.20	-0.32	-1.52	-2.24	-2.40	-0.2	**48.1**	RUN 6
-0.32	0.08	0.40	-2.40	-3.04	-0.6	**55.8**	RUN 7
-0.32	0.08	0.40	-2.40	-3.04	-0.6	**53.8**	RUN 8
-0.32	0.08	0.40	-2.40	-3.04	-0.6	**54.1**	RUN 9


No. 2 SRU Stack Gas Concentrations
* Calibrations
Run 1
*
Run 2
*
Run 3
*
Sulfur Dioxide (ppm)
Oxygen (percent)
150
125
100
75
50
25
0
30
25
20
15
10
5
0
4/27/2010 6:00
4/27/2010 7:00
4/27/2010 8:00
4/27/2010 9:00
4/27/2010 10:00
4/27/2010 11:00
Date/Time
Sulfur Dioxide
Oxygen