TEST REPORT FOR
2020 CEMS RATA AT THE
DESERT VIEW POWER MECCA PLANT

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REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature: _____ Date: 4/2/2020

Name: Dave Wonderly Title: Client Project Manager

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: _____ Date: 4/2/2020

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TABLE OF CONTENTS

SECTION **PAGE**

1.0 INTRODUCTION 6
2.0 UNIT DESCRIPTION 9
2.1 TEST CONDITIONS 10
2.2 SAMPLE LOCATIONS 10
3.0 TEST DESCRIPTIONS 12
3.1 NO_X, O_2, CO_2, AND CO 13
3.2 SULFUR DIOXIDE 13
3.3 VELOCITY AND MOISTURE 13
3.4 RATA TEST PROCEDURES 14
4.0 RESULTS 15
4.1 UNIT 1 RATA RESULTS 15
4.2 UNIT 2 RATA RESULTS 26

LIST OF APPENDICES

A FIELD AND PLANT OPERATING DATA 36
A.1 Unit 1 Data 37
A.1.1 Unit 1 Sample Location 38
A.1.2 Unit 1 CEMS Data 40
A.1.3 Unit 1 Instrument Strip Chart Data 42
A.1.4 Unit 1 SO_2 Data and Velocity Data 50
A.1.5 Unit 1 Plant Data 61
A.2 Unit 2 Data 71
A.2.1 Unit 2 Sample Location 72
A.2.2 Unit 2 CEMS Data 74
A.2.3 Unit 2 Instrument Strip Chart Data 85
A.2.4 Unit 2 SO_2 Data and Velocity Data 92
A.2.5 Unit 2 Plant Data 103
A.3 Calibration Data 113
B CALCULATIONS 137
B.1 General Emissions Calculations 138
B.2 Unit 1 Calculations 144
B.3 Unit 2 Calculations 154
C QUALITY ASSURANCE 164
C.1 Quality Assurance Program Summary 165
C.2 CARB, SCAQMD, and STAC Certifications 171
C.3 Individual QI Certifications 176
D TEST PLAN 180

TABLE OF CONTENTS (CONTINUED)

SECTION **PAGE**

LIST OF TABLES

1-1 RELATIVE ACCURACY RESULT SUMMARY UNIT 1 7
1-2 RELATIVE ACCURACY RESULT SUMMARY UNIT 2 8
2-1 CONTINUOUS EMISSION MONITOR SYSTEM UNITS 1 AND 2 9
2-2 AVERAGE DAILY UNIT DATA 10
3-1 TEST MATRIX PER UNIT 12
4-1 NO_X PPM UNIT 1 16
4-2 NO_X PPM @ 3% O_2 UNIT 1 17
4-3 NO_X LB/HR UNIT 1 18
4-4 SO_2 PPM UNIT 1 19
4-5 SO_2 PPM @ 3% O_2 UNIT 1 20
4-6 SO_2 LB/HR UNIT 1 21
4-7 CO PPM UNIT 1 22
4-8 CO PPM @ 3% O_2 UNIT 1 23
4-9 CO LB/HR UNIT 1 24
4-10 O_2 % UNIT 1 25
4-11 NO_X PPM UNIT 2 26
4-12 NO_X PPM @ 3% O_2 UNIT 2 27
4-13 NO_X LB/HR UNIT 2 28
4-14 SO_2 PPM UNIT 2 29
4-15 SO_2 PPM @ 3% O_2 UNIT 2 30
4-16 SO_2 LB/HR UNIT 2 31
4-17 CO PPM UNIT 2 32
4-18 CO PPM @ 3% O_2 UNIT 2 33
4-19 CO LB/HR UNIT 2 34
4-20 O_2 % UNIT 2 35

LIST OF FIGURES

2-1 SCHEMATIC OF THE DESERT VIEW POWER, SAMPLE LOCATION 11

1.0 INTRODUCTION

Montrose Air Quality Services, LLC (MAQS) was contracted by Desert View Power to conduct the annual relative accuracy test audit (RATA) testing at the Desert View Power Project located in Mecca, California. Testing was conducted on March 10 and 12, 2020. The MAQS test team consisted of Dave Wonderly, Robert Howard, Arlene Bell and Patrick Whitman. Dave Wonderly was the on-site Qualified Individual for MAQS. Kevin Lawrence of Desert View Power coordinated plant operations and data retrieval during the test program. The South Coast Air Quality Management District (SCAQMD) was notified of the test date but did not send a representative.

RATA tests were conducted on the units 1 and 2 continuous emissions monitoring system (CEMS).

The plant CEMS met all RATA requirements of CFR 40 Appendix F.

Tables 1-1 and 1-2 present the results of the RATA tests for Unit 1 and Unit 2, respectively.

TABLE 1-1
RELATIVE ACCURACY RESULT SUMMARY UNIT 1
DESERT VIEW POWER
MARCH 12, 2020

Parameter/Units	RA	Limit	Comment
NO_x			
ppm	4.43%	20%	Pass
@ 3% O_2	4.29%	20%	Pass
lb/hr	11.83%	20%	Pass
O_2, dry	0.86%	20%	Pass
CO			
ppm(1)	-1.87	<5 ppm(1)	Pass
@ 3% O_2(1)	-2.91	<5 ppm(1)	Pass
lb/hr(2)	2.25%	5%(2)	Pass
SO_2			
ppm	12.48%	20%	Pass
@ 3% O_2	12.54%	20%	Pass
lb/hr	5.56%	20%	Pass

(1) PS 4A Criteria, average difference less than 5ppm
(2) Of applicable standard

TABLE 1-2
RELATIVE ACCURACY RESULT SUMMARY UNIT 2
DESERT VIEW POWER
MARCH 10, 2020

Parameter/Units	RA	Limit	Comment
NO_x			
ppm	7.34%	20%	Pass
@ 3% O_2	7.62%	20%	Pass
lb/hr	6.97%	20%	Pass
O_2, dry	0.99%	20%	Pass
CO			
ppm(1)	-1.44	<5 ppm(1)	Pass
@ 3% O_2(1)	-2.28	<5 ppm(1)	Pass
lb/hr(2)	1.52%	5%(2)	Pass
SO_2			
ppm	15.41%	20%	Pass
@ 3% O_2	13.02%	20%	Pass
lb/hr	7.88%	20%	Pass

(1) PS 4A Criteria, average difference less than 5ppm
(2) Of applicable standard

2.0 UNIT DESCRIPTION

The Desert View Power Plant consists of two 297 MMBtu/hr, circulating bed, biomass-fired boilers. The combined units are designed to produce 47 MW of net electrical output. Each unit is equipped with the following pollution control systems:

- An ammonia injection system for control of NO_x emissions
- Cyclonic mixing of injected ammonia with flue gas to provide for a minimum amount of ammonia slip (emission)
- A limestone injection system to limit emissions of SO_2
- A reverse air baghouse to control opacity and emissions of sulfates and particulate to very low levels

The plant CEMS system for each unit includes measurements of NO_x, O_2, CO, O_2 wet, SO_2, CO_2, flow and opacity. It is an extractive system with a heated line extending from the probe to the CEMS unit. Table 2-1 presents the current CEMS configuration.

TABLE 2-1
CONTINUOUS EMISSION MONITOR SYSTEM
UNITS 1 AND 2
DESERT VIEW POWER

Species	Manufacturer	Unit 1, Model/Serial Number	Unit 2, Model/Serial Number	Range
NO_x	CAI	ZRE/A3F4992T	ZRE/A3F4993T	100 and 500 ppm
CO	CAI	ZRE/A3F4992T	ZRE/A3F4993T	100 and 500 ppm
O_2 Dry	CAI	ZRE/A3F4992T	ZRE/A3F4993T	25%
SO_2	CAI	ZRE/A3F4992T	ZRE/A3F4993T	50 and 500 ppm
CO_2	CAI	ZRE/A3F4992T	ZRE/A3F4993T	20%
O_2 Wet	Thermox	WDG	WDG	25%
Flow	Dietrick Standard/Rosemont	0260938	--	Msdcfh
Opacity	Monitor Labs	Lighthawk 560	Lighthawk 560	100%
NO_2 Convertor	CAI	ZDL04001	ZDL04001	

2.1 TEST CONDITIONS

The tests were conducted at normal steady state operating conditions. Limestone injection rate, fuel combustion rate, ammonia injection rate, ash handling operations, excess air level, combustion air distribution, and combustor temperature were set to maintain stable unit operation. Pertinent operating conditions were recorded by Desert View Power personnel during the tests as presented in Table 2-2.

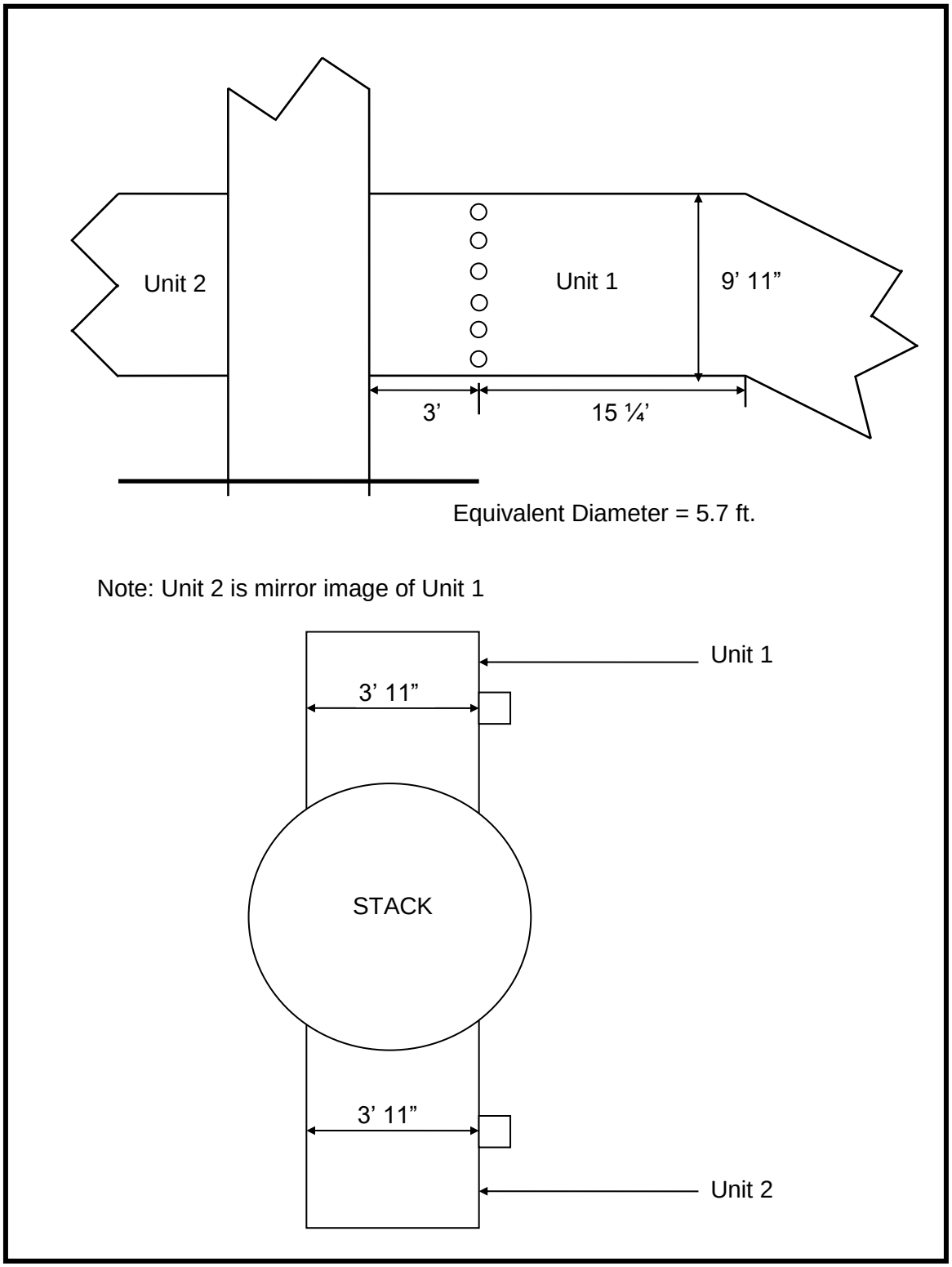
TABLE 2-2
AVERAGE DAILY UNIT DATA
DESERT VIEW POWER
MARCH AND APRIL, 2020

Date	Combined	Gross MW	Total Steam Production
3/10/2020	Units 1 & 2	38	377
3/12/2020	Units 1 & 2	41	276

2.2 SAMPLE LOCATIONS

All sampling was conducted at the stack breaching ducts to the stack. Desert View Power previously conducted three-dimensional flow testing and stratification testing on the baghouse exhaust ducts on each unit. This testing was performed in accordance to SCAQMD Chapter X, Section 1 and 13 and was presented in the report titled "Stack Gas Stratification and Absence of Flow Disturbance Testing at Desert View Power," (R106E622.T) submitted to SCAQMD in October of 1994. A copy of the sample location certification report can be found in the test plan in Appendix E of this report. The sample locations meet the requirements. All testing for both Unit 1 and 2 was conducted at the sample location presented in Figure 2-1.

FIGURE 2-1
SCHEMATIC OF THE DESERT VIEW POWER, SAMPLE LOCATION



3.0 TEST DESCRIPTIONS

The test procedures that were used are listed in Table 3-1. The performance test runs for gaseous plant emissions were in some cases also used for RATA test runs. A minimum of nine reference method tests are required for all gaseous species relative accuracy (RA) determinations.

TABLE 3-1
TEST MATRIX PER UNIT
DESERT VIEW POWER

Parameter	No. of Tests	Measurement Principle	Reference Method	Duration per Test
NO_x	10(1)	Chemiluminescence	EPA 7E	30 minutes
CO	10(1)	Non-Dispersive Infrared	Modified EPA 10	30 minutes
CO_2	10(1)	Non-Dispersive Infrared	EPA 3A	30 minutes
O_2	10(1)	Electrochemical	EPA 3A	30 minutes
SO_2	10(1)	Barium Thorin Titration	EPA 6	30 minutes
Stack Gas Flow Rate	--	S-Type Pitot Traverse	EPA 2	--
Moisture	--	Condensation/Gravimetric	EPA 4	--

(1) Includes compliance and RATA test runs

3.1 NO_X, O_2, CO_2, AND CO

NO_x, O_2, CO_2 and CO were measured according to EPA reference methods using MAQS' CEMS. NO_x, O_2, CO_2 and CO concentrations were determined using MAQS' mobile emission measurement laboratory. The laboratory is housed in a truck outfitted to provide a clean, quiet, environmentally controlled base for the testing operations. The laboratory has lighting, electrical distribution, air conditioning and heating to support the test instruments and provide for optimal test performance.

Concentrations of these gaseous species were measured using an extractive sampling system consisting of a stainless steel probe to minimize reactions, a heat traced Teflon sample line connected to a thermo-electrically cooled sample dryer. Following the dryer, the sample is drawn into a Teflon lined pump where it is pressurized and then filtered for delivery to the gas analysis portion of the system. Gaseous samples were collected at a single point. Three 60-minute compliance tests were performed.

NO_x concentration was determined using a California Analytical Model 600. The analyzer full scale range was 100 ppm. The analyzer is equipped with a NO_2 - NO converter for the determination of total nitrogen oxides without interference from other nitrogen containing compounds.

Oxygen concentration was determined using an California Analytical Model 600 analyzer The analyzer full scale range was 20%.

CO_2 was measured using a non-dispersive infrared analyzer manufactured by Horiba (model #PIR 2000). The analyzer full scale range was 20%.

CO was measured using a non-dispersive infrared/gas filter correlation analyzer manufactured by TECO (model 48i). The analyzer full scale range was 10 ppm.

The analyzers and sampling system were subjected to a variety of calibration and quality assurance procedures including leak checks, linearity and calibration error determinations before sampling, and system bias and drift determinations as part of each test run. Data are corrected for any observed bias or drift in accordance with the reference methods.

3.2 SULFUR DIOXIDE

Sulfur dioxide was measured according to EPA Method 6. A barium Thorin titration of the hydrogen peroxide impinger samples yielded SO_2 concentrations for a minimum of nine relative accuracy tests. The sample system consisted of heated glass probe and filter connected by Teflon tubing to the glass sample train consisting of a series of hydrogen peroxide filled impingers. Prior to the titrimetric analysis, all SO_x samples were passed through an ion exchange resin. This removes interferences associated with ammonium (NH_4).

3.3 VELOCITY AND MOISTURE

Stack gas velocity and moisture content were determined by EPA Methods 2 and 4 during the particulate testing. Velocity traverses were performed during each set of compliance tests (NO_x, CO, SO_2 and hydrocarbons) and RATA test runs.

3.4 RATA TEST PROCEDURES

Relative accuracy tests were performed on NO_x, SO_2, CO and CO_2 sub-systems of each unit's CEMS. Relative accuracy was determined by comparing the CEMS data to the corresponding reference method (RM) data over nine test runs. A minimum of nine - 30 minute runs were performed on Units 1 and 2 for the NO_x, SO_2, CO, and CO_2. Relative accuracy is expressed in terms of the absolute value of the mean of the difference between the monitor value and the reference method value. It is reported in terms of a percentage of the mean reference method value. The computational procedure is summarized by the following equations:

$$\overline{RM} = \frac{1}{n}\sum_{i=1}^{n} RM_i$$

$$\bar{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$$

$$s_d = \left[\frac{\sum_{i=1}^{n} d_i^2 - \frac{\left[\sum_{i=1}^{n} di\right]^2}{n}}{n-1} \right]^{\frac{1}{2}}$$

$$CC = t_{0.975}\frac{S_d}{\sqrt{n}}$$

$$RA = \frac{|\bar{d}| + |CC|}{\overline{RM}} x100$$

Where:

$\overline{RM}$ = mean value of the reference method

$\bar{d}$ = average difference between RM and CEMS (RM – CEMS)

$|\bar{d}|$ = absolute value of the difference between RM and CEMS

S_d = sample standard deviation of the difference between RM and CEMS

RA = Relative Accuracy

$t_{0.975}$ = t value at 95% confidence interval

n = number of valid tests

4.0 RESULTS

This section presents the results of the RATA tests conducted at Desert View Power during March of 2020. Test results are presented in the following sections:

- 4.1 Unit 1 RATA Results
- 4.2 Unit 2 RATA Results

All supporting data sheets, CEMS data, instrument strip charts, and plant data are included in Appendix A. Laboratory reports and sample chain of custody records are contained in Appendix B. Emissions and Load calculations are presented in Appendix C. Quality assurance information is contained in Appendix D. The test plan that was submitted and is contained in Appendix E.

4.1 UNIT 1 RATA RESULTS

Tables 4-1 through 4-10 present the CEMS RATA for Unit 1. The results demonstrate that the CEMS for Unit 1 is in control as defined in CFR 40, Appendix F. The results of the RATA are presented in units of ppm dry, ppm @ 3% O_2, and lb/hr for NO_x, CO and SO_2. O_2 results are presented in concentration units of %.

TABLE 4-1
NO_X PPM UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM NO_x ppm dry	CEMS NO_x ppm dry	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	39.4	41.3	-1.9	Y
2	3/12/2020	7:43	40.1	41.7	-1.5	Y
3	3/12/2020	8:29	40.6	42.4	-1.8	Y
4	3/12/2020	9:13	38.4	40.0	-1.6	Y
5	3/12/2020	9:57	39.7	41.3	-1.6	Y
6	3/12/2020	10:41	38.8	40.4	-1.6	Y
7	3/12/2020	11:25	37.1	38.5	-1.4	Y
8	3/12/2020	12:10	40.8	41.9	-1.2	Y
9	3/12/2020	12:57	37.4	38.3	-0.9	Y

Ref. Method Average:	39.14	ppm
CEMS Average:	40.63	ppm
Average Difference:	-1.49	ppm
Number of Tests:	9	
Standard Deviation:	0.32	ppm
t Value:	2.306	
Confidence Coefficient:	0.24	ppm
Relative Accuracy:	4.43	% of Reference Method

TABLE 4-2
NO_X PPM @ 3% O_2 UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM NO_x ppmc	CEMS NO_x ppmc	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	60.8	63.8	-3.0	Y
2	3/12/2020	7:43	62.7	65.0	-2.2	Y
3	3/12/2020	8:29	63.1	66.1	-3.0	Y
4	3/12/2020	9:13	58.8	61.5	-2.7	Y
5	3/12/2020	9:57	61.3	63.7	-2.3	Y
6	3/12/2020	10:41	59.6	61.8	-2.2	Y
7	3/12/2020	11:25	57.5	59.6	-2.1	Y
8	3/12/2020	12:10	63.6	65.6	-1.9	Y
9	3/12/2020	12:57	82.4	84.4	-2.0	Y

Ref. Method Average:	63.31	ppmc
CEMS Average:	65.70	ppmc
Average Difference:	-2.39	ppmc
Number of Tests:	9	
Standard Deviation:	0.43	ppmc
t Value:	2.306	
Confidence Coefficient:	0.33	
Relative Accuracy:	4.29	% of Reference Method

TABLE 4-3
NO_X LB/HR UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM NO_x lb/hr	CEMS NO_x lb/hr	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	26.53	27.23	-0.70	Y
2	3/12/2020	7:43	27.02	27.32	-0.30	Y
3	3/12/2020	8:29	27.27	27.23	0.03	Y
4	3/12/2020	9:13	26.02	25.63	0.38	Y
5	3/12/2020	9:57	26.85	26.39	0.46	Y
6	3/12/2020	10:41	26.29	25.58	0.71	Y
7	3/12/2020	11:25	24.97	24.32	0.66	Y
8	3/12/2020	12:10	27.31	26.39	0.92	Y
9	3/12/2020	12:57	26.42	18.45	7.97	Y

Ref. Method Average:	26.518	lb/hr
CEMS Average:	25.394	lb/hr
Average Difference:	1.125	lb/hr
Number of Tests:	9	
Standard Deviation:	2.617	lb/hr
t Value:	2.306	
Confidence Coefficient:	2.0119	
Relative Accuracy:	11.83	% of Reference Method

TABLE 4-4
SO_2 PPM UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM SO_2 ppm dry	CEMS SO_2 ppm dry	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	9.2	8.7	0.4	Y
2	3/12/2020	7:43	8.5	8.6	-0.1	Y
3	3/12/2020	8:29	8.6	8.9	-0.3	Y
4	3/12/2020	9:13	6.5	7.0	-0.6	Y
5	3/12/2020	9:57	7.3	8.2	-0.9	Y
6	3/12/2020	10:41	8.8	10.0	-1.2	Y
7	3/12/2020	11:25	5.9	6.7	-0.8	Y
8	3/12/2020	12:10	7.0	7.7	-0.7	Y
9	3/12/2020	12:57	0.5	0.4	0.0	Y

Ref. Method Average:	6.91	ppm
CEMS Average:	7.36	ppm
Average Difference:	-0.46	ppm
Number of Tests:	9	
Standard Deviation:	0.53	ppm
t Value:	2.306	
Confidence Coefficient:	0.40	ppm
Relative Accuracy:	12.48	% of Reference Method

TABLE 4-5
SO_2 PPM @ 3% O_2 UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM SO_2 ppm dry	CEMS SO_2 ppm dry	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	14.1	13.5	0.6	Y
2	3/12/2020	7:43	13.3	13.4	-0.1	Y
3	3/12/2020	8:29	13.4	13.8	-0.5	Y
4	3/12/2020	9:13	9.9	10.8	-0.9	Y
5	3/12/2020	9:57	11.3	12.7	-1.4	Y
6	3/12/2020	10:41	13.5	15.2	-1.8	Y
7	3/12/2020	11:25	9.2	10.6	-1.4	Y
8	3/12/2020	12:10	10.9	12.0	-1.1	Y
9	3/12/2020	12:57	1.0	0.9	0.1	Y

Ref. Method Average:	10.72	ppmc
CEMS Average:	11.45	ppmc
Average Difference:	-0.73	ppmc
Number of Tests:	9	
Standard Deviation:	0.80	ppmc
t Value:	2.306	
Confidence Coefficient:	0.62	ppmc
Relative Accuracy:	12.54	% of Reference Method

TABLE 4-6
SO_2 LB/HR UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM SO_2 lb/hr	CEMS SO_2 lb/hr	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	8.58	7.96	0.62	Y
2	3/12/2020	7:43	7.97	7.82	0.16	Y
3	3/12/2020	8:29	8.04	7.92	0.11	Y
4	3/12/2020	9:13	6.10	6.26	-0.17	Y
5	3/12/2020	9:57	6.86	7.29	-0.43	Y
6	3/12/2020	10:41	8.26	8.77	-0.51	Y
7	3/12/2020	11:25	5.54	5.94	-0.39	Y
8	3/12/2020	12:10	6.51	6.76	-0.25	Y
9	3/12/2020	12:57	0.45	0.29	0.16	Y

Ref. Method Average:	6.48	lb/hr
CEMS Average:	6.56	lb/hr
Average Difference:	-0.08	lb/hr
Number of Tests:	9	
Standard Deviation:	0.37	lb/hr
t Value:	2.306	
Confidence Coefficient:	0.28	ppmc
Relative Accuracy:	5.56	% of Reference Method

TABLE 4-7
CO PPM UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM CO ppm dry	CEMS CO ppm dry	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	0.1	3.1	-2.9	Y
2	3/12/2020	7:43	0.1	2.8	-2.7	Y
3	3/12/2020	8:29	0.1	2.1	-2.0	Y
4	3/12/2020	9:13	0.1	2.3	-2.1	Y
5	3/12/2020	9:57	0.1	2.7	-2.6	Y
6	3/12/2020	10:41	0.1	2.2	-2.1	Y
7	3/12/2020	11:25	0.1	1.6	-1.5	Y
8	3/12/2020	12:10	0.1	1.1	-1.0	Y
9	3/12/2020	12:57	0.2	0.1	0.0	Y

Ref. Method Average:	0.12	ppm
CEMS Average:	1.99	ppm
Average Difference:	-1.87	(PS 4A Criteria: Avg. Diff. less than 5 ppm)
Number of Tests:	9	
Standard Deviation:	0.92	ppm
t Value:	2.306	
Confidence Coefficient:	0.71	ppm
Relative Accuracy:	N/A	% of Reference Method

TABLE 4-8
CO PPM @ 3% O_2 UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM CO ppm @ 3% O_2	CEMS CO ppm @ 3% O_2	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	0.2	4.8	-4.5	Y
2	3/12/2020	7:43	0.1	4.4	-4.2	Y
3	3/12/2020	8:29	0.2	3.3	-3.1	Y
4	3/12/2020	9:13	0.2	3.5	-3.3	Y
5	3/12/2020	9:57	0.2	4.2	-4.0	Y
6	3/12/2020	10:41	0.2	3.4	-3.2	Y
7	3/12/2020	11:25	0.2	2.5	-2.3	Y
8	3/12/2020	12:10	0.1	1.8	-1.6	Y
9	3/12/2020	12:57	0.3	0.2	0.1	Y

Ref. Method Average:	0.20	ppmc
CEMS Average:	3.11	ppmc
Average Difference:	-2.91	(PS 4A Criteria: Avg. Diff. less than 5 ppm)
Number of Tests:	9	
Standard Deviation:	1.46	ppmc
t Value:	2.306	
Confidence Coefficient:	1.12	ppmc
Relative Accuracy:	N/A	% of Reference Method

TABLE 4-9
CO LB/HR UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM CO lb/hr	CEMS CO lb/hr	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	0.06	1.22	-1.16	Y
2	3/12/2020	7:43	0.04	1.10	-1.06	Y
3	3/12/2020	8:29	0.05	0.82	-0.77	Y
4	3/12/2020	9:13	0.06	0.89	-0.83	Y
5	3/12/2020	9:57	0.05	1.04	-0.99	Y
6	3/12/2020	10:41	0.05	0.85	-0.80	Y
7	3/12/2020	11:25	0.05	0.61	-0.57	Y
8	3/12/2020	12:10	0.04	0.43	-0.39	Y
9	3/12/2020	12:57	0.07	0.03	0.04	Y

Ref. Method Average:	0.05	lb/hr
CEMS Average:	0.78	lb/hr
Average Difference:	-0.73	lb/hr
Number of Tests:	9	
Standard Deviation:	0.373	
t Value:	2.306	
Confidence Coefficient:	0.286	
Applicable Standard:	45.0	lb/hr
Relative Accuracy:	N/A	% of Reference Method
Relative Accuracy:	2.25	% of Applicable Standard

TABLE 4-10
O_2 % UNIT 1
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 12, 2020

Run #	Date	Time	RM O_2 % dry	CEMS O_2 % dry	Difference	Use Data? (Y or N)
1	3/12/2020	7:00	9.28	9.40	-0.12	Y
2	3/12/2020	7:43	9.44	9.50	-0.05	Y
3	3/12/2020	8:29	9.38	9.48	-0.10	Y
4	3/12/2020	9:13	9.22	9.29	-0.07	Y
5	3/12/2020	9:57	9.31	9.35	-0.04	Y
6	3/12/2020	10:41	9.26	9.30	-0.04	Y
7	3/12/2020	11:25	9.35	9.38	-0.03	Y
8	3/12/2020	12:10	9.44	9.50	-0.06	Y
9	3/12/2020	12:57	12.77	12.77	0.00	Y

Ref. Method Average:	9.72	
CEMS Average:	9.77	
Average Difference:	-0.06	
Number of Tests:	9	
Standard Deviation:	0.04	
t Value:	2.306	
Confidence Coefficient:	0.03	
Relative Accuracy:	0.86	% of Reference Method

4.2 UNIT 2 RATA RESULTS

Tables 4-11 through 4-20 present the CEMS RATA results for Unit 2. The results demonstrate that the CEMS for Unit 2 is in control as defined in CFR 40 Appendix F. The results of the RATA are presented in units of ppm dry, ppm @ 3% O_2 and lb/hr for NO_x, CO and SO_2. O_2 results are presented in concentration units of %.

TABLE 4-11
NO_X PPM UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM NO_x ppm dry	CEMS NO_x ppm dry	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	35.2	38.0	-2.8	Y
2	3/10/2020	7:43	35.8	38.7	-2.9	Y
3	3/10/2020	8:25	37.6	40.4	-2.8	Y
4	3/10/2020	9:08	40.0	42.8	-2.8	Y
5	3/10/2020	9:50	40.2	42.8	-2.6	Y
6	3/10/2020	10:37	35.1	38.2	-3.1	Y
7	3/10/2020	11:21	42.8	45.6	-2.8	Y
8	3/10/2020	12:06	42.3	45.1	-2.7	Y
9	3/10/2020	12:50	49.7	52.7	-2.9	Y

Ref. Method Average:	39.86	ppm
CEMS Average:	42.68	ppm
Average Difference:	-2.82	ppm
Number of Tests:	9	
Standard Deviation:	0.13	ppm
t Value:	2.306	
Confidence Coefficient:	0.10	ppm
Relative Accuracy:	7.34	% of Reference Method

TABLE 4-12
NO_X PPM @ 3% O_2 UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM NO_x ppmc	CEMS NO_x ppmc	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	55.5	60.1	-4.6	Y
2	3/10/2020	7:43	57.2	62.2	-5.0	Y
3	3/10/2020	8:25	60.1	64.6	-4.5	Y
4	3/10/2020	9:08	62.5	67.2	-4.6	Y
5	3/10/2020	9:50	61.4	65.7	-4.3	Y
6	3/10/2020	10:37	56.0	60.7	-4.8	Y
7	3/10/2020	11:21	67.1	71.4	-4.3	Y
8	3/10/2020	12:06	67.0	71.6	-4.6	Y
9	3/10/2020	12:50	78.5	83.3	-4.8	Y

Ref. Method Average:	62.81	ppmc
CEMS Average:	67.42	ppmc
Average Difference:	-4.61	ppmc
Number of Tests:	9	
Standard Deviation:	0.23	ppmc
t Value:	2.306	
Confidence Coefficient:	0.18	
Relative Accuracy:	7.62	% of Reference Method

TABLE 4-13
NO_X LB/HR UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM NO_x lb/hr	CEMS NO_x lb/hr	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	22.04	24.22	-2.18	Y
2	3/10/2020	7:43	22.11	24.38	-2.26	Y
3	3/10/2020	8:25	24.24	25.45	-1.21	Y
4	3/10/2020	9:08	25.64	27.10	-1.46	Y
5	3/10/2020	9:50	25.97	26.69	-0.72	Y
6	3/10/2020	10:37	22.57	22.64	-0.07	Y
7	3/10/2020	11:21	27.53	26.31	1.22	Y
8	3/10/2020	12:06	27.39	24.91	2.48	Y
9	3/10/2020	12:50	31.58	27.15	4.44	Y

Ref. Method Average:	25.452	lb/hr
CEMS Average:	25.426	lb/hr
Average Difference:	0.026	lb/hr
Number of Tests:	9	
Standard Deviation:	2.272	lb/hr
t Value:	2.306	
Confidence Coefficient:	1.7467	
Relative Accuracy:	6.97	% of Reference Method

TABLE 4-14
SO_2 PPM UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM SO_2 ppm dry	CEMS SO_2 ppm dry	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	4.5	4.4	0.0	Y
2	3/10/2020	7:43	7.5	8.1	-0.6	Y
3	3/10/2020	8:25	10.2	11.3	-1.1	Y
4	3/10/2020	9:08	11.5	12.4	-0.9	Y
5	3/10/2020	9:50	7.6	8.5	-0.9	Y
6	3/10/2020	10:37	3.5	3.7	-0.2	Y
7	3/10/2020	11:21	9.2	10.5	-1.3	Y
8	3/10/2020	12:06	10.3	11.6	-1.4	Y
9	3/10/2020	12:50	11.2	12.7	-1.6	Y

Ref. Method Average:	8.37	ppm
CEMS Average:	9.24	ppm
Average Difference:	-0.87	ppm
Number of Tests:	9	
Standard Deviation:	0.54	ppm
t Value:	2.306	
Confidence Coefficient:	0.42	ppm
Relative Accuracy:	15.41	% of Reference Method

TABLE 4-15
SO_2 PPM @ 3% O_2 UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM SO_2 ppm dry	CEMS SO_2 ppm dry	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	7.0	7.0	0.1	Y
2	3/10/2020	7:43	12.0	13.0	-1.0	Y
3	3/10/2020	8:25	16.4	18.0	-1.6	Y
4	3/10/2020	9:08	17.9	19.4	-1.4	Y
5	3/10/2020	9:50	11.6	12.8	-1.2	Y
6	3/10/2020	10:37	5.5	5.8	-0.3	Y
7	3/10/2020	11:21	14.4	16.4	-2.1	Y
8	3/10/2020	12:06	16.3	18.4	-2.1	Y
9	3/10/2020	12:50	17.6	18.2	-0.6	Y

Ref. Method Average:	13.19	ppmc
CEMS Average:	14.33	ppmc
Average Difference:	-1.14	ppmc
Number of Tests:	9	
Standard Deviation:	0.75	ppmc
t Value:	2.306	
Confidence Coefficient:	0.58	ppmc
Relative Accuracy:	13.02	% of Reference Method

TABLE 4-16
SO_2 LB/HR UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM SO_2 lb/hr	CEMS SO_2 lb/hr	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	3.89	3.94	-0.04	Y
2	3/10/2020	7:43	6.45	7.09	-0.64	Y
3	3/10/2020	8:25	9.18	9.94	-0.76	Y
4	3/10/2020	9:08	10.24	10.96	-0.72	Y
5	3/10/2020	9:50	6.83	7.40	-0.57	Y
6	3/10/2020	10:37	3.09	3.01	0.08	Y
7	3/10/2020	11:21	8.20	8.45	-0.25	Y
8	3/10/2020	12:06	9.25	8.98	0.27	Y
9	3/10/2020	12:50	9.85	9.70	0.15	Y

Ref. Method Average:	7.44	lb/hr
CEMS Average:	7.72	lb/hr
Average Difference:	-0.28	lb/hr
Number of Tests:	9	
Standard Deviation:	0.40	lb/hr
t Value:	2.306	
Confidence Coefficient:	0.31	ppmc
Relative Accuracy:	7.88	% of Reference Method

TABLE 4-17
CO PPM UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM CO ppm dry	CEMS CO ppm dry	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	0.1	2.2	-2.1	Y
2	3/10/2020	7:43	0.0	1.9	-1.9	Y
3	3/10/2020	8:25	0.1	2.0	-1.9	Y
4	3/10/2020	9:08	0.1	1.5	-1.5	Y
5	3/10/2020	9:50	0.1	1.0	-1.0	Y
6	3/10/2020	10:37	0.1	1.3	-1.2	Y
7	3/10/2020	11:21	0.1	1.6	-1.6	Y
8	3/10/2020	12:06	0.1	1.1	-1.1	Y
9	3/10/2020	12:50	0.3	1.0	-0.7	Y

Ref. Method Average:	0.08	ppm
CEMS Average:	1.52	ppm
Average Difference:	-1.44	(PS 4A Criteria: Avg. Diff. less than 5 ppm)
Number of Tests:	9	
Standard Deviation:	0.48	ppm
t Value:	2.306	
Confidence Coefficient:	0.37	ppm
Relative Accuracy:	N/A	% of Reference Method

TABLE 4-18
CO PPM @ 3% O_2 UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER,
MARCH 21, 2020

Run #	Date	Time	RM CO ppm @ 3% O_2	CEMS CO ppm @ 3% O_2	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	0.1	3.5	-3.4	Y
2	3/10/2020	7:43	0.1	3.1	-3.0	Y
3	3/10/2020	8:25	0.1	3.2	-3.1	Y
4	3/10/2020	9:08	0.1	2.4	-2.3	Y
5	3/10/2020	9:50	0.1	1.6	-1.5	Y
6	3/10/2020	10:37	0.1	2.0	-1.9	Y
7	3/10/2020	11:21	0.1	2.6	-2.5	Y
8	3/10/2020	12:06	0.1	1.8	-1.7	Y
9	3/10/2020	12:50	0.4	1.5	-1.1	Y

Ref. Method Average:	0.13	ppmc
CEMS Average:	2.40	ppmc
Average Difference:	-2.28	(PS 4A Criteria: Avg. Diff. less than 5 ppm)
Number of Tests:	9	
Standard Deviation:	0.78	ppmc
t Value:	2.306	
Confidence Coefficient:	0.60	ppmc
Applicable Standard:	231.0	ppmc
Relative Accuracy:	N/A	% of Reference Method

TABLE 4-19
CO LB/HR UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM CO lb/hr	CEMS CO lb/hr	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	0.02	0.85	-0.83	Y
2	3/10/2020	7:43	0.02	0.73	-0.71	Y
3	3/10/2020	8:25	0.03	0.75	-0.73	Y
4	3/10/2020	9:08	0.02	0.58	-0.56	Y
5	3/10/2020	9:50	0.02	0.39	-0.36	Y
6	3/10/2020	10:37	0.02	0.44	-0.42	Y
7	3/10/2020	11:21	0.02	0.57	-0.55	Y
8	3/10/2020	12:06	0.02	0.38	-0.36	Y
9	3/10/2020	12:50	0.10	0.33	-0.23	Y

Ref. Method Average:	0.03	lb/hr
CEMS Average:	0.56	lb/hr
Average Difference:	-0.53	lb/hr
Number of Tests:	9	
Standard Deviation:	0.201	
t Value:	2.306	
Confidence Coefficient:	0.155	
Applicable Standard:	45.0	lb/hr
Relative Accuracy:	N/A	% of Reference Method
Relative Accuracy:	1.52	% of Applicable Standard

TABLE 4-20
O_2 % UNIT 2
RELATIVE ACCURACY TEST AUDIT SUMMARY
DESERT VIEW POWER
MARCH 21, 2020

Run #	Date	Time	RM O_2 % dry	CEMS O_2 % dry	Difference	Use Data? (Y or N)
1	3/10/2020	7:00	9.54	9.61	-0.08	Y
2	3/10/2020	7:43	9.71	9.81	-0.10	Y
3	3/10/2020	8:25	9.70	9.78	-0.08	Y
4	3/10/2020	9:08	9.45	9.53	-0.08	Y
5	3/10/2020	9:50	9.18	9.30	-0.12	Y
6	3/10/2020	10:37	9.67	9.72	-0.04	Y
7	3/10/2020	11:21	9.49	9.54	-0.05	Y
8	3/10/2020	12:06	9.59	9.68	-0.09	Y
9	3/10/2020	12:50	9.56	9.61	-0.05	Y

Ref. Method Average:	9.54	
CEMS Average:	9.62	
Average Difference:	-0.08	
Number of Tests:	9	
Standard Deviation:	0.02	
t Value:	2.306	
Confidence Coefficient:	0.02	
Relative Accuracy:	0.99	% of Reference Method

APPENDIX A
FIELD AND PLANT OPERATING DATA

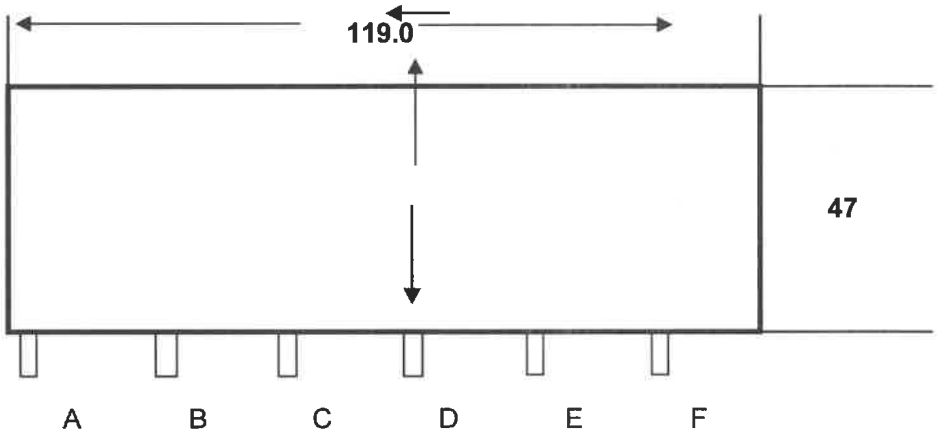
Appendix A.1
Unit 1 Data

Appendix A.1.1
Unit 1 Sample Location

Method 1

Client: Desert View Power Date: 3/10/2020

Sample Location: Unit 1-2 Prepared By: Dave Wonderly



H (in.)	**119.0**
W (in.)	**47.0**
Nipple length	**13.0**
Distance between points	**9.40**
Stack Area (ft^2)	**38.84**

Point No.	Sample Point Inches from nozzle	
1	4.7	17.7
2	14.1	27.1
3	23.5	36.5
4	32.9	45.9
5	42.3	55.3

Appendix A.1.2
Unit 1 CEMS Data

Date	Time	O2 %	CO2 %	NOx ppm	CO ppm	
3/12/2020	6:26	18.991	18.93	90.526	9.664	
3/12/2020	6:27	19.089	18.931	90.541	9.641	
3/12/2020	6:28	19.155	18.945	90.563	9.641	High
3/12/2020	6:29	12.966	12.034	43.427	8.033	
3/12/2020	6:30	10.526	10.532	47.689	4.784	
3/12/2020	6:31	10.526	10.53	47.622	4.743	Mid
3/12/2020	6:32	5.299	4.702	18.199	3.876	
3/12/2020	6:33	0.006	0.05	0.055	0.212	
3/12/2020	6:34	0.004	0.047	0.042	0.005	Zero
3/12/2020	6:35	0.004	0.046	0.021	0.004	NO Mode Zero
3/12/2020	6:36	18.875	0.123	34.546	0.234	
3/12/2020	6:37	20.742	0.253	90.904	0.493	NO Mode High
3/12/2020	6:38	20.865	0.132	40.307	0.504	
3/12/2020	6:39	20.906	0.084	0.102	0.52	NO2 Gas NO Mode
3/12/2020	6:40	20.902	0.114	36.686	0.525	
3/12/2020	6:41	20.741	0.24	43.795	0.51	NO2 Gas NOx Mode
3/12/2020	6:42	19.621	1.846	21.903	0.502	
3/12/2020	6:43	9.887	10.574	28.869	0.24	
3/12/2020	6:44	9.221	11.223	41.046	0.145	
3/12/2020	6:45	10.351	9.993	19.616	0.138	
3/12/2020	6:46	10.403	10.09	23.433	0.156	
3/12/2020	6:47	9.088	11.412	48.749	0.143	
3/12/2020	6:48	10.28	10.258	12.526	0.127	
3/12/2020	6:49	10.495	10.461	0.141	0.05	O2 CO2 Bias
3/12/2020	6:50	0.272	0.099	0.148	2.154	
3/12/2020	6:51	0.151	0.064	0.126	4.694	
3/12/2020	6:52	0.145	0.052	6.036	4.745	CO Bias
3/12/2020	6:53	0.138	0.047	47.066	2.129	
3/12/2020	6:54	0.018	0.045	47.65	0.418	NOx Bias
3/12/2020	6:55	7.786	8.829	35.85	0.297	
3/12/2020	6:56	8.864	11.577	56.436	0.126	
3/12/2020	6:57	9.197	11.128	47.262	0.128	
3/12/2020	6:58	9.643	10.742	40.716	0.141	
3/12/2020	6:59	8.996	11.356	49.063	0.139	
3/12/2020	7:00	8.776	11.574	48.187	0.138	
3/12/2020	7:01	9.01	11.372	43.865	0.152	
3/12/2020	7:02	8.409	11.887	57.954	0.155	
3/12/2020	7:03	9.44	10.919	44.745	0.171	
3/12/2020	7:04	9.775	10.486	28.897	0.2	
3/12/2020	7:05	9.38	11.037	45.158	0.212	
3/12/2020	7:06	8.915	11.358	47.258	0.176	
3/12/2020	7:07	10.116	10.217	28.854	0.194	
3/12/2020	7:08	10.566	9.856	15.229	0.213	
3/12/2020	7:09	10.21	10.192	21.925	0.234	
3/12/2020	7:10	9.972	10.35	25.192	0.202	
3/12/2020	7:11	9.284	11.073	35.899	0.204	

3/12/2020	7:12	10.085	10.329	26.736	0.193	
3/12/2020	7:13	9.604	10.762	32.06	0.196	
3/12/2020	7:14	8.286	12.025	55.334	0.182	
3/12/2020	7:15	9.047	11.262	46.248	0.176	
3/12/2020	7:16	8.93	11.359	50.16	0.175	
3/12/2020	7:17	9.974	10.377	33.827	0.192	
3/12/2020	7:18	8.988	11.381	43.163	0.196	
3/12/2020	7:19	8.819	11.464	44.509	0.177	
3/12/2020	7:20	8.284	12.053	63.991	0.174	
3/12/2020	7:21	9.475	10.83	44.919	0.179	
3/12/2020	7:22	9.283	11.029	42.101	0.185	
3/12/2020	7:23	8.818	11.495	49.206	0.182	
3/12/2020	7:24	8.73	11.581	56.09	0.17	
3/12/2020	7:25	9.922	10.339	30.32	0.179	
3/12/2020	7:26	10.108	10.293	21.593	0.22	
3/12/2020	7:27	9.247	11.069	27.626	0.21	
3/12/2020	7:28	9.257	11.064	27.704	0.197	
3/12/2020	7:29	8.557	11.835	48.521	0.189	
3/12/2020	7:30	8.413	11.941	50.02	0.182	
Run 1 Average		9.30	11.04	39.64	0.19	
3/12/2020	7:31	10.139	10.39	2.591	0.127	
3/12/2020	7:32	10.475	10.407	0.075	0.056	
3/12/2020	7:33	1.456	0.912	0.493	1.503	
3/12/2020	7:34	0.028	0.057	0.073	4.693	
3/12/2020	7:35	0.025	0.053	0.07	4.774	
3/12/2020	7:36	0.159	0.179	38.096	3.489	
3/12/2020	7:37	0.024	0.05	47.37	0.464	NOx Bias
3/12/2020	7:38	0.443	0.065	11.644	0.265	
3/12/2020	7:39	0.017	0.046	0.043	0.013	Zero
3/12/2020	7:40	7.426	8.329	40.603	1.307	
3/12/2020	7:41	10.551	10.447	47.622	4.632	
3/12/2020	7:42	10.549	10.446	47.623	4.752	Span
3/12/2020	7:43	9.925	10.732	36.064	2.999	
3/12/2020	7:44	10.162	10.162	26.242	0.163	
3/12/2020	7:45	9.342	11.201	47.504	0.134	
3/12/2020	7:46	9.062	11.391	49.903	0.117	
3/12/2020	7:47	9.377	10.835	41.168	0.121	
3/12/2020	7:48	10.607	9.86	25.398	0.141	
3/12/2020	7:49	9.232	11.304	51.674	0.147	
3/12/2020	7:50	9.192	11.146	49.397	0.125	
3/12/2020	7:51	8.998	11.486	58.765	0.115	
3/12/2020	7:52	8.613	11.732	59.232	0.114	
3/12/2020	7:53	9.308	11.005	44.444	0.121	
3/12/2020	7:54	9.858	10.576	32.571	0.141	
3/12/2020	7:55	9.709	10.678	30.709	0.15	
3/12/2020	7:56	9.757	10.623	32.309	0.152	
3/12/2020	7:57	9.664	10.656	32.296	0.153	
3/12/2020	7:58	9.218	11.182	43.384	0.17	
3/12/2020	7:59	10.476	9.874	22.576	0.191	

3/12/2020	8:00	9.658	10.738	31.95	0.185	
3/12/2020	8:01	8.543	11.83	53.92	0.153	
3/12/2020	8:02	9.157	11.113	46.88	0.138	
3/12/2020	8:03	8.197	12.135	70.523	0.139	
3/12/2020	8:04	9.92	10.395	33.092	0.145	
3/12/2020	8:05	9.501	10.879	35.933	0.161	
3/12/2020	8:06	9.11	11.186	42.358	0.144	
3/12/2020	8:07	9.097	11.177	37.576	0.137	
3/12/2020	8:08	9.397	10.841	35.904	0.156	
3/12/2020	8:09	10.126	10.197	24.601	0.17	
3/12/2020	8:10	9.269	11.084	39.033	0.174	
3/12/2020	8:11	9.148	11.121	37.84	0.152	
3/12/2020	8:12	9.103	11.12	37.386	0.157	
3/12/2020	8:13	9.77	10.434	27.234	0.162	
Run 2 Average		9.42	10.93	40.06	0.15	
3/12/2020	8:14	10.275	10.207	3.364	0.136	
3/12/2020	8:15	10.427	10.341	0.088	0.052	O2 CO2 Bias
3/12/2020	8:16	1.751	1.059	0.174	1.467	
3/12/2020	8:17	0.029	0.058	0.072	4.668	
3/12/2020	8:18	0.024	0.056	0.072	4.74	CO Bias
3/12/2020	8:19	0.119	0.138	42.427	3.061	
3/12/2020	8:20	0.027	0.054	47.012	0.431	NOx Bias
3/12/2020	8:21	0.023	0.053	45.876	0.409	
3/12/2020	8:22	0.228	0.049	0.177	0.161	
3/12/2020	8:23	0.004	0.047	0.046	-0.005	Zero
3/12/2020	8:24	7.506	8.32	40.471	1.182	
3/12/2020	8:25	10.519	10.415	47.773	4.568	
3/12/2020	8:26	10.515	10.419	47.776	4.718	Span
3/12/2020	8:27	9.957	10.525	37.516	3.754	
3/12/2020	8:28	9.888	10.438	28.3	0.317	
3/12/2020	8:29	9.146	11.172	42.348	0.149	
3/12/2020	8:30	9.295	10.972	37.003	0.146	
3/12/2020	8:31	9.312	10.911	39.02	0.173	
3/12/2020	8:32	9.918	10.38	30.514	0.185	
3/12/2020	8:33	9.574	10.776	39.427	0.189	
3/12/2020	8:34	9.115	11.135	42.385	0.185	
3/12/2020	8:35	9.406	10.958	42.793	0.154	
3/12/2020	8:36	8.633	11.573	56.917	0.151	
3/12/2020	8:37	8.742	11.5	52.109	0.143	
3/12/2020	8:38	9.576	10.742	42.195	0.148	
3/12/2020	8:39	9.718	10.465	35.316	0.171	
3/12/2020	8:40	9.866	10.402	30.687	0.198	
3/12/2020	8:41	10.165	10.221	31.046	0.215	
3/12/2020	8:42	9.228	10.96	40.636	0.204	
3/12/2020	8:43	9.905	10.32	32.381	0.205	
3/12/2020	8:44	9.644	10.675	35.219	0.216	
3/12/2020	8:45	8.624	11.619	48.285	0.203	
3/12/2020	8:46	8.625	11.641	55.279	0.208	
3/12/2020	8:47	8.906	11.302	46.438	0.195	

3/12/2020	8:48	8.943	11.255	49.724	0.202	
3/12/2020	8:49	8.985	11.238	43.039	0.198	
3/12/2020	8:50	9.139	11.187	43.408	0.202	
3/12/2020	8:51	8.972	11.203	45.123	0.201	
3/12/2020	8:52	8.962	11.277	47.985	0.194	
3/12/2020	8:53	9.629	10.587	31.716	0.202	
3/12/2020	8:54	9.955	10.269	27.171	0.227	
3/12/2020	8:55	9.579	10.694	31.931	0.226	
3/12/2020	8:56	8.662	11.688	52.289	0.219	
3/12/2020	8:57	9.142	11.04	42.739	0.197	
3/12/2020	8:58	10.276	9.998	25.117	0.205	
3/12/2020	8:59	9.976	10.369	34.639	0.217	
Run 3 Average		9.35	10.91	40.42	0.19	
3/12/2020	9:00	10.256	10.263	2.064	0.146	
3/12/2020	9:01	10.45	10.355	0.089	0.069	O2 CO2 Bias
3/12/2020	9:02	3.412	2.768	0.374	0.906	
3/12/2020	9:03	0.035	0.063	0.073	4.543	
3/12/2020	9:04	0.033	0.06	0.073	4.791	CO Bias
3/12/2020	9:05	0.134	0.144	42.24	3.034	
3/12/2020	9:06	0.033	0.054	47.205	0.439	NOx Bias
3/12/2020	9:07	0.253	0.059	17.548	0.323	
3/12/2020	9:08	0.01	0.049	0.055	0.021	Zero
3/12/2020	9:09	7.549	8.447	40.738	1.272	
3/12/2020	9:10	10.544	10.397	47.777	4.634	
3/12/2020	9:11	10.538	10.403	47.776	4.752	Span
3/12/2020	9:12	9.548	11.08	43.877	3.122	
3/12/2020	9:13	8.673	11.64	48.732	0.214	
3/12/2020	9:14	9.327	10.944	40.771	0.174	
3/12/2020	9:15	9.291	11.071	41.872	0.192	
3/12/2020	9:16	9.424	10.863	35.924	0.188	
3/12/2020	9:17	9.073	11.21	41.692	0.201	
3/12/2020	9:18	9.373	10.989	33.995	0.197	
3/12/2020	9:19	8.924	11.309	40.928	0.202	
3/12/2020	9:20	9.043	11.28	39.485	0.212	
3/12/2020	9:21	9.788	10.427	28.154	0.199	
3/12/2020	9:22	8.407	12.009	63.586	0.217	
3/12/2020	9:23	8.478	11.691	51.478	0.17	
3/12/2020	9:24	9.626	10.647	31.386	0.196	
3/12/2020	9:25	8.933	11.394	37.625	0.218	
3/12/2020	9:26	8.583	11.733	51.255	0.192	
3/12/2020	9:27	9.104	11	41.341	0.186	
3/12/2020	9:28	9.726	10.635	32.353	0.213	
3/12/2020	9:29	9.168	11.067	36.688	0.199	
3/12/2020	9:30	9.268	10.943	37.573	0.192	
3/12/2020	9:31	9.261	11.081	42.083	0.203	
3/12/2020	9:32	8.573	11.681	50.611	0.174	
3/12/2020	9:33	9.488	10.635	29.558	0.192	
3/12/2020	9:34	9.153	11.169	35.462	0.223	
3/12/2020	9:35	9.328	10.858	28.775	0.225	

3/12/2020	9:36	9.207	11	31.037	0.237	
3/12/2020	9:37	9.45	10.818	28.199	0.225	
3/12/2020	9:38	9.283	11.022	31.308	0.216	
3/12/2020	9:39	8.914	11.277	42.286	0.194	
3/12/2020	9:40	9.228	10.986	34.002	0.189	
3/12/2020	9:41	9.419	10.787	31.885	0.215	
3/12/2020	9:42	9.236	11.057	39.719	0.206	
3/12/2020	9:43	9.202	11.05	37.428	0.202	
Run 4 Average		9.18	11.09	38.28	0.20	
3/12/2020	9:44	9.861	10.507	10.906	0.149	
3/12/2020	9:45	10.406	10.358	0.085	0.047	O2 CO2 Bias
3/12/2020	9:46	1.11	0.583	1.071	1.659	
3/12/2020	9:47	0.033	0.062	0.072	4.687	
3/12/2020	9:48	0.033	0.059	0.072	4.75	CO Bias
3/12/2020	9:49	0.166	0.188	41.714	3.073	
3/12/2020	9:50	0.011	0.056	47.082	0.128	NOx Bias
3/12/2020	9:51	0.005	0.054	28.964	-0.009	
3/12/2020	9:52	0.005	0.051	0.071	-0.006	Zero
3/12/2020	9:53	6.938	7.778	38.361	1.038	
3/12/2020	9:54	10.508	10.425	47.772	4.539	
3/12/2020	9:55	10.504	10.433	47.763	4.716	Span
3/12/2020	9:56	9.608	10.903	43.245	3.594	
3/12/2020	9:57	9.647	10.562	28.663	0.277	
3/12/2020	9:58	9.73	10.657	27.992	0.169	
3/12/2020	9:59	8.924	11.411	48.761	0.152	
3/12/2020	10:00	9.194	11.148	38.898	0.153	
3/12/2020	10:01	9.019	11.239	41.329	0.154	
3/12/2020	10:02	8.524	11.694	49.37	0.159	
3/12/2020	10:03	9.295	11.038	37.82	0.162	
3/12/2020	10:04	9.696	10.579	31.034	0.176	
3/12/2020	10:05	9.617	10.767	32.774	0.168	
3/12/2020	10:06	8.979	11.223	41.153	0.161	
3/12/2020	10:07	9.285	11.011	38.515	0.169	
3/12/2020	10:08	9.59	10.686	29.357	0.171	
3/12/2020	10:09	9.521	10.808	31.772	0.19	
3/12/2020	10:10	9.183	11.121	39.942	0.169	
3/12/2020	10:11	8.362	11.889	60.111	0.164	
3/12/2020	10:12	9.451	10.708	37.187	0.169	
3/12/2020	10:13	9.772	10.568	29.205	0.18	
3/12/2020	10:14	9.181	11.131	41.072	0.189	
3/12/2020	10:15	8.783	11.351	47.084	0.167	
3/12/2020	10:16	8.981	11.358	51.538	0.164	
3/12/2020	10:17	8.494	11.685	53.897	0.142	
3/12/2020	10:18	9.104	11.2	44.618	0.152	
3/12/2020	10:19	9.698	10.487	28.347	0.169	
3/12/2020	10:20	10.246	10.018	24.623	0.198	
3/12/2020	10:21	10.043	10.153	20.734	0.209	
3/12/2020	10:22	9.337	11.034	32.824	0.193	
3/12/2020	10:23	8.153	12.116	57.086	0.158	

3/12/2020	10:24	8.821	11.303	48.026	0.141	
3/12/2020	10:25	9.255	10.881	46.724	0.146	
3/12/2020	10:26	9.687	10.609	40.652	0.166	
3/12/2020	10:27	9.55	10.689	36.142	0.172	
Run 5 Average		9.25	11.02	39.62	0.17	
3/12/2020	10:28	10.148	10.276	2.641	0.132	
3/12/2020	10:29	10.406	10.326	0.071	0.043	O2 CO2 Bias
3/12/2020	10:30	1.982	1.352	1.095	1.341	
3/12/2020	10:31	0.031	0.061	0.072	4.633	
3/12/2020	10:32	0.027	0.057	0.072	4.743	CO Bias
3/12/2020	10:33	0.121	0.137	41.446	3.147	
3/12/2020	10:34	0.026	0.053	47.285	0.097	
3/12/2020	10:35	0.015	0.05	13.158	-0.006	
3/12/2020	10:36	0.007	0.048	0.046	-0.01	Zero
3/12/2020	10:37	1.96	8.231	40.274	1.208	
3/12/2020	10:38	10.475	10.433	47.728	4.588	
3/12/2020	10:39	10.471	10.427	47.612	4.707	Span
3/12/2020	10:40	9.507	10.796	45.125	3.845	
3/12/2020	10:41	9.433	10.836	41.683	0.309	
3/12/2020	10:42	9.922	10.36	31.66	0.139	
3/12/2020	10:43	8.943	11.353	50.31	0.137	
3/12/2020	10:44	9.258	10.969	40.51	0.119	
3/12/2020	10:45	9.461	10.814	41.388	0.113	
3/12/2020	10:46	9.091	11.154	47.335	0.115	
3/12/2020	10:47	9.254	10.95	47.499	0.118	
3/12/2020	10:48	8.883	11.404	52.732	0.112	
3/12/2020	10:49	9.548	10.688	37.515	0.111	
3/12/2020	10:50	8.788	11.484	51.832	0.123	
3/12/2020	10:51	9.17	11.101	45.18	0.113	
3/12/2020	10:52	8.49	11.741	63.868	0.118	
3/12/2020	10:53	8.48	11.867	64.604	0.12	
3/12/2020	10:54	8.004	12.228	70.361	0.105	
3/12/2020	10:55	9.257	10.889	37.319	0.133	
3/12/2020	10:56	9.819	10.454	28.264	0.195	
3/12/2020	10:57	8.813	11.474	40.373	0.214	
3/12/2020	10:58	9.285	10.924	26.896	0.182	
3/12/2020	10:59	8.703	11.576	41.376	0.176	
3/12/2020	11:00	8.965	11.159	34.008	0.156	
3/12/2020	11:01	9.6	10.676	25.753	0.228	
3/12/2020	11:02	9.406	10.791	25.429	0.219	
3/12/2020	11:03	9.401	10.85	23.107	0.191	
3/12/2020	11:04	9.204	11.067	27.364	0.197	
3/12/2020	11:05	8.557	11.721	38.515	0.239	
3/12/2020	11:06	9.031	11.116	35.63	0.222	
3/12/2020	11:07	9.207	10.958	35.648	0.222	
3/12/2020	11:08	9.577	10.677	26.96	0.232	
3/12/2020	11:09	9.549	10.61	26.173	0.229	
3/12/2020	11:10	10.058	10.15	25.345	0.246	
3/12/2020	11:11	10.388	9.963	21.134	0.245	

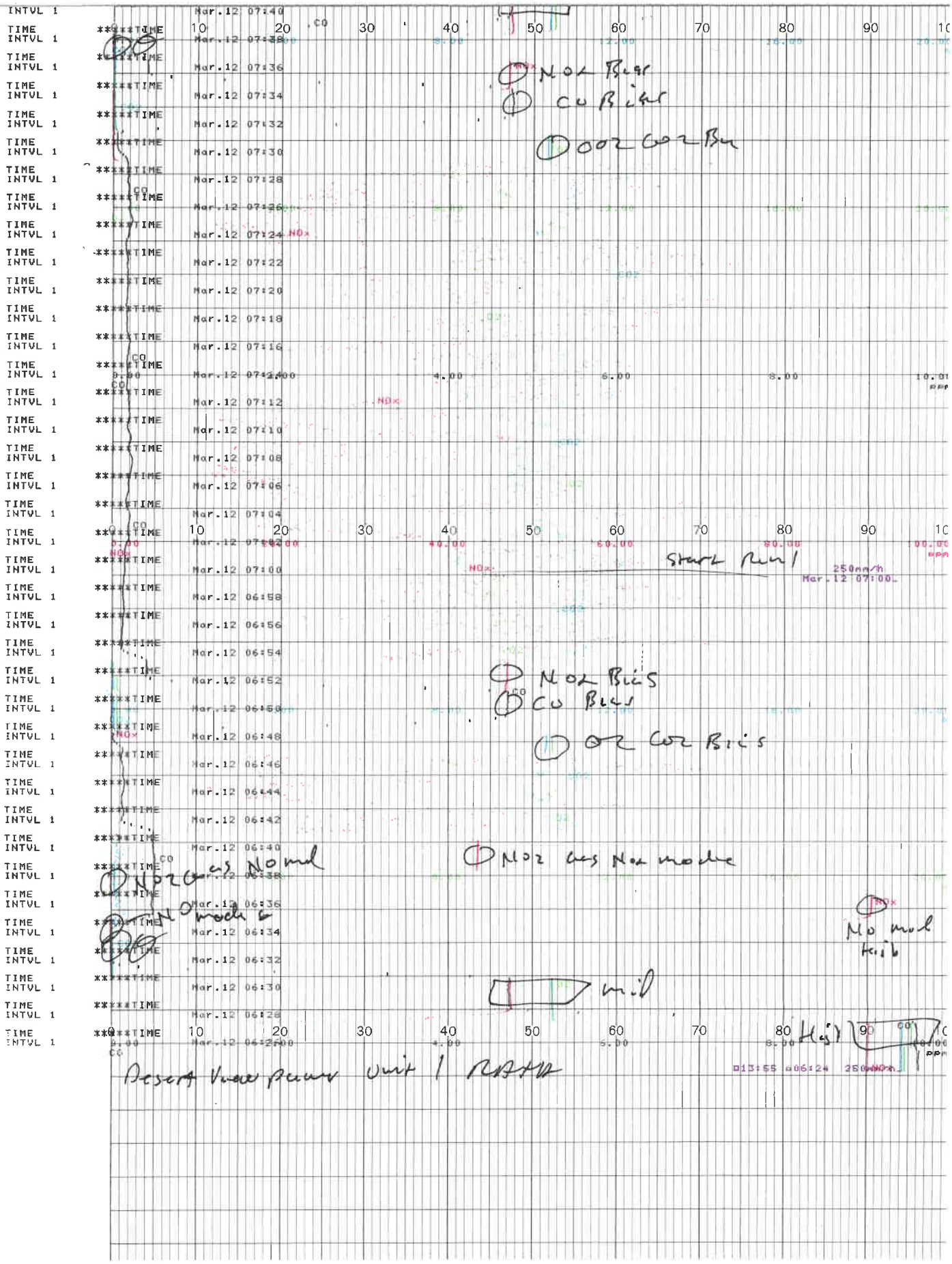
Run 6 Average		9.20	11.04	38.80	0.17	
3/12/2020	11:12	10.181	10.268	2.594	0.154	
3/12/2020	11:13	10.421	10.317	0.059	0.047	O2 CO2 Bias
3/12/2020	11:14	1.855	1.202	0.326	1.41	
3/12/2020	11:15	0.022	0.061	0.041	4.677	
3/12/2020	11:16	0.025	0.058	0.041	4.782	CO Bias
3/12/2020	11:17	0.204	0.21	40.073	3.294	
3/12/2020	11:18	0.023	0.054	47.39	0.358	NOx Bias
3/12/2020	11:19	2.828	1.242	6.573	0.025	
3/12/2020	11:20	-0.086	0.046	0.033	0.02	Zero
3/12/2020	11:21	7.573	8.653	41.499	1.346	
3/12/2020	11:22	10.497	10.409	47.752	4.658	
3/12/2020	11:23	10.497	10.391	47.744	4.763	Span
3/12/2020	11:24	10.096	11.118	53.714	3.544	
3/12/2020	11:25	9.125	11.117	50.08	0.232	
3/12/2020	11:26	9.519	10.728	39.395	0.149	
3/12/2020	11:27	9.673	10.78	38.706	0.173	
3/12/2020	11:28	8.316	11.953	53.851	0.17	
3/12/2020	11:29	9.085	11.104	41.201	0.173	
3/12/2020	11:30	9.578	10.755	30.71	0.188	
3/12/2020	11:31	9.999	10.318	34.314	0.17	
3/12/2020	11:32	10.043	10.34	33.318	0.172	
3/12/2020	11:33	9.09	11.177	46.343	0.165	
3/12/2020	11:34	9.16	11.201	42.399	0.163	
3/12/2020	11:35	8.853	11.395	43.199	0.148	
3/12/2020	11:36	9.788	10.581	33.635	0.166	
3/12/2020	11:37	8.555	11.71	47.923	0.173	
3/12/2020	11:38	9.03	11.28	42.502	0.147	
3/12/2020	11:39	9.475	10.861	38.889	0.149	
3/12/2020	11:40	9.316	10.979	36.383	0.168	
3/12/2020	11:41	9.295	10.808	29.655	0.162	
3/12/2020	11:42	9.696	10.275	22.789	0.157	
3/12/2020	11:43	9.536	10.472	24.46	0.177	
3/12/2020	11:44	9.278	10.627	26.753	0.176	
3/12/2020	11:45	8.58	11.133	39.413	0.145	
3/12/2020	11:46	8.543	11.139	42.068	0.122	
3/12/2020	11:47	8.367	11.227	45.38	0.12	
3/12/2020	11:48	9.666	9.971	35.119	0.121	
3/12/2020	11:49	9.899	9.825	32.802	0.13	
3/12/2020	11:50	9.861	9.81	28.703	0.134	
3/12/2020	11:51	9.134	10.575	38.983	0.127	
3/12/2020	11:52	9.115	10.519	43.191	0.116	
3/12/2020	11:53	9.289	10.4	37.976	0.115	
3/12/2020	11:54	9.772	9.807	32.848	0.118	
3/12/2020	11:55	9.873	9.848	32.737	0.132	
Run 7 Average		9.31	10.72	37.19	0.15	
3/12/2020	11:56	10.235	10.236	2.827	0.096	
3/12/2020	11:57	10.449	10.344	0.057	0.034	O2 CO2 Bias
3/12/2020	11:58	1.767	1.144	0.463	1.392	

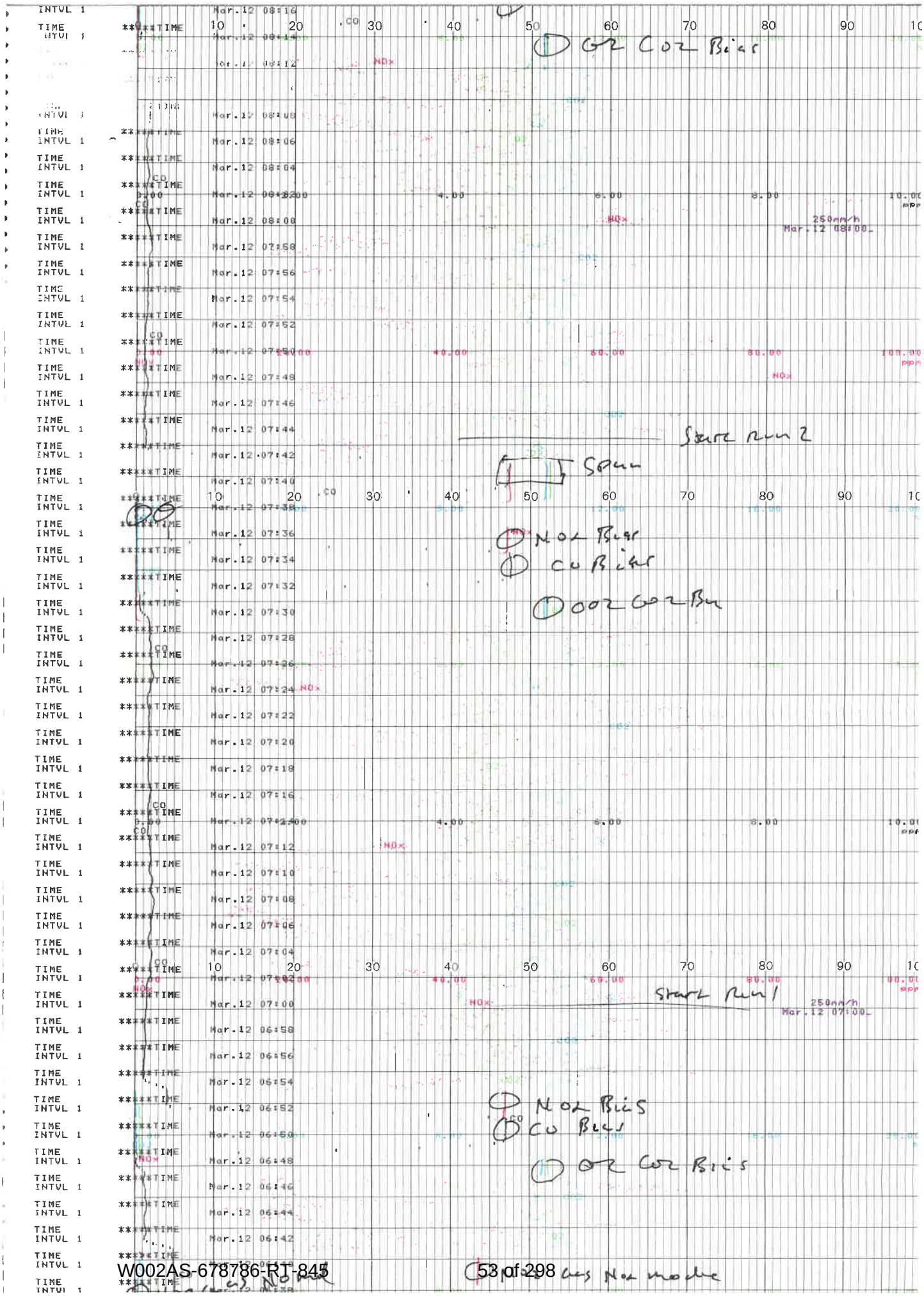
3/12/2020	11:59	0.023	0.059	0.041	4.672	
3/12/2020	12:00	0.022	0.054	0.041	4.762	CO Bias
3/12/2020	12:01	0.156	0.173	11.043	4.718	
3/12/2020	12:02	0.022	0.052	47.418	1.669	NOx Bias
3/12/2020	12:03	0.656	0.313	15.568	0.294	
3/12/2020	12:04	0.01	0.048	0.041	0.013	Zero
3/12/2020	12:05	7.555	8.433	40.946	1.297	
3/12/2020	12:06	10.479	10.449	47.803	4.618	
3/12/2020	12:07	10.479	10.453	47.799	4.736	Span
3/12/2020	12:08	10.347	10.441	47.042	4.694	
3/12/2020	12:09	8.617	11.051	51.162	1.583	
3/12/2020	12:10	9.733	9.893	38.191	0.093	
3/12/2020	12:11	9.317	10.425	39.532	0.105	
3/12/2020	12:12	9.163	10.581	43.555	0.103	
3/12/2020	12:13	9.134	10.449	45.726	0.108	
3/12/2020	12:14	9.207	10.492	42.096	0.118	
3/12/2020	12:15	8.989	10.658	41.819	0.133	
3/12/2020	12:16	10.043	9.643	31.3	0.12	
3/12/2020	12:17	9.165	10.532	41.734	0.11	
3/12/2020	12:18	9.565	10.153	39.656	0.108	
3/12/2020	12:19	9.062	10.597	46.267	0.105	
3/12/2020	12:20	9.128	10.523	44.244	0.103	
3/12/2020	12:21	9.587	10.046	40.608	0.109	
3/12/2020	12:22	9.647	10.002	35.298	0.115	
3/12/2020	12:23	9.869	9.848	31.47	0.113	
3/12/2020	12:24	9.963	9.699	35.023	0.111	
3/12/2020	12:25	9.737	10.05	33.955	0.113	
3/12/2020	12:26	8.957	10.67	43.626	0.1	
3/12/2020	12:27	9.621	10.119	37.684	0.105	
3/12/2020	12:28	9.073	10.589	41.266	0.102	
3/12/2020	12:29	9.427	10.18	38.803	0.102	
3/12/2020	12:30	10.537	9.158	31.944	0.122	
3/12/2020	12:31	10.407	9.298	30.502	0.123	
3/12/2020	12:32	9.886	9.806	36.762	0.12	
3/12/2020	12:33	9.705	10.045	41.568	0.139	
3/12/2020	12:34	9.289	10.344	44.614	0.139	
3/12/2020	12:35	8.88	10.79	50.679	0.137	
3/12/2020	12:36	9.261	10.499	48.822	0.146	
3/12/2020	12:37	9.084	10.616	47.423	0.137	
3/12/2020	12:38	8.164	11.436	53.814	0.116	
3/12/2020	12:39	8.579	10.895	47.861	0.114	
3/12/2020	12:40	9.559	9.957	37.758	0.114	
Run 8 Average		9.40	10.27	40.85	0.12	
3/12/2020	12:41	10.194	10.285	3.803	0.075	
3/12/2020	12:42	10.423	10.404	0.07	0.014	O2 CO2 Bias
3/12/2020	12:43	4.393	3.779	0.53	0.524	
3/12/2020	12:44	0.021	0.061	0.043	4.268	
3/12/2020	12:45	6.271	5.305	24.686	3.809	
3/12/2020	12:46	5.023	3.18	18.755	0.57	

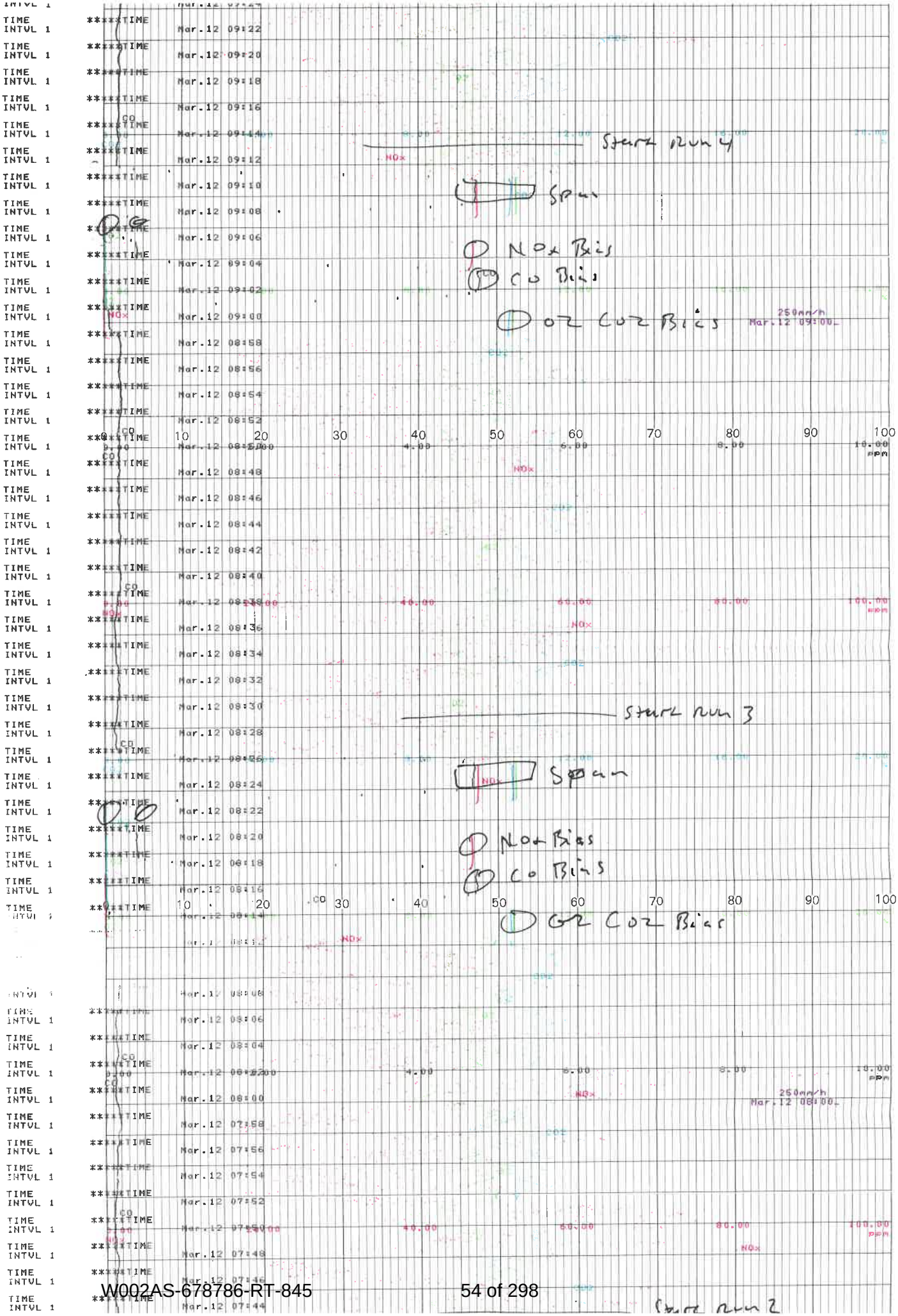
3/12/2020	12:47	0.017	0.058	0.065	4.098	
3/12/2020	12:48	0.016	0.054	0.04	4.714	CO Bias
3/12/2020	12:49	0.11	0.132	24.352	4.305	
3/12/2020	12:50	0.016	0.055	47.375	0.724	NOx Bias
3/12/2020	12:51	0.005	0.05	11.593	0.069	
3/12/2020	12:52	0.004	0.047	0.044	-0.021	Zero
3/12/2020	12:53	3.03	3.942	19.486	0.126	
3/12/2020	12:54	10.46	10.449	47.807	3.685	
3/12/2020	12:55	10.457	10.461	47.834	4.691	Span
3/12/2020	12:56	9.773	9.918	48.43	4.013	
3/12/2020	12:57	9.53	9.165	45.994	0.374	
3/12/2020	12:58	10.096	8.627	41.731	0.111	
3/12/2020	12:59	10.755	7.733	41.864	0.121	
3/12/2020	13:00	11.59	6.857	38.923	0.138	
3/12/2020	13:01	11.585	6.761	34.786	0.137	
3/12/2020	13:02	11.703	6.606	32.882	0.138	
3/12/2020	13:03	11.497	6.718	33.362	0.159	
3/12/2020	13:04	10.94	7.264	34.68	0.142	
3/12/2020	13:05	11.517	6.808	41.799	0.139	
3/12/2020	13:06	12.525	5.742	57.807	0.145	
3/12/2020	13:07	11.538	6.822	62.805	0.162	
3/12/2020	13:08	11.796	6.318	63.403	0.133	
3/12/2020	13:09	12.198	6.094	63.934	0.149	
3/12/2020	13:10	12.902	5.348	61.413	0.142	
3/12/2020	13:11	12.654	5.526	58.789	0.158	
3/12/2020	13:12	12.997	5.289	21.838	0.163	
3/12/2020	13:13	13.019	5.143	16.793	0.158	
3/12/2020	13:14	13.611	4.516	26.168	0.157	
3/12/2020	13:15	14.06	4.236	41.31	0.181	
3/12/2020	13:16	14.309	3.802	34.54	0.169	
3/12/2020	13:17	14.746	3.453	26.63	0.189	
3/12/2020	13:18	14.672	3.495	26.148	0.188	
3/12/2020	13:19	14.176	3.733	26.55	0.182	
3/12/2020	13:20	14.004	3.827	26.977	0.179	
3/12/2020	13:21	13.522	4.121	28.856	0.179	
3/12/2020	13:22	13.394	4.168	29.665	0.172	
3/12/2020	13:23	13.203	4.294	29.814	0.166	
3/12/2020	13:24	13.084	4.337	29.873	0.162	
3/12/2020	13:25	13.138	4.306	29.559	0.158	
3/12/2020	13:26	13.087	4.367	30.577	0.163	
3/12/2020	13:27	12.449	4.733	32.239	0.158	
Run 9 Average		12.69	5.37	37.52	0.16	
3/12/2020	13:28	10.804	9.161	7.274	0.109	
3/12/2020	13:29	10.415	10.434	0.157	-0.002	O2 CO2 Bias
3/12/2020	13:30	2.067	1.408	41.163	0.077	
3/12/2020	13:31	0.018	0.06	47.421	0.343	NOx Bias
3/12/2020	13:32	0.142	0.106	16.965	0.932	
3/12/2020	13:33	0.011	0.056	0.127	4.456	
3/12/2020	13:34	0.01	0.053	0.099	4.696	CO Bias

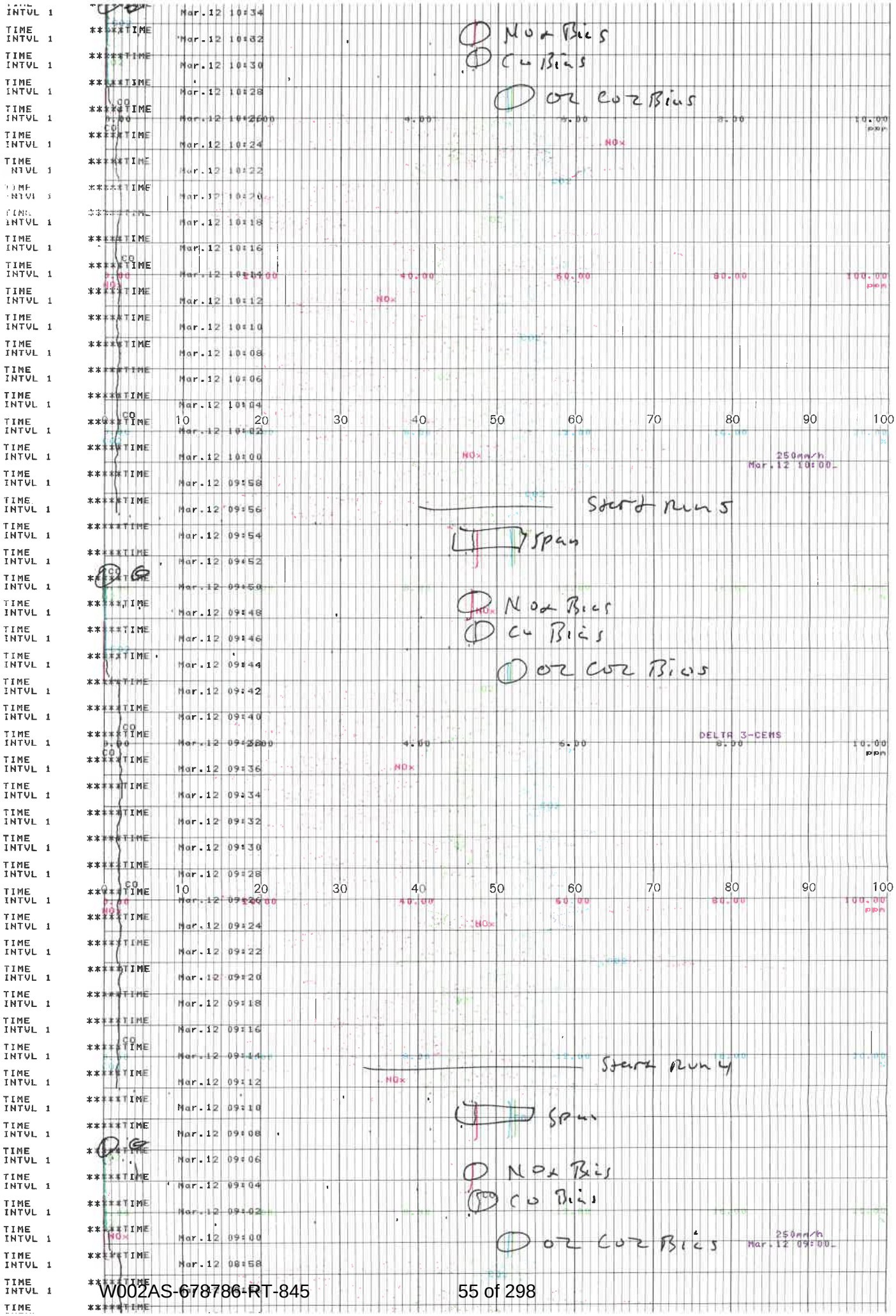
3/12/2020	13:35	8.227	8.797	41.797	4.694	
3/12/2020	13:36	10.44	10.481	47.746	4.684	Span
3/12/2020	13:37	3.353	2.644	8.763	3.006	
3/12/2020	13:38	-0.003	0.052	0.04	0.014	
3/12/2020	13:39	-0.007	0.05	0.04	-0.024	Zero
3/12/2020	13:40	11.33	11.128	51.754	0.507	
3/12/2020	13:41	19.025	18.888	90.564	8.166	
3/12/2020	13:42	19.032	18.901	90.556	9.567	Span
3/12/2020	13:43	19.036	18.912	90.331	9.574	
3/12/2020	13:44	19.037	18.923	90.447	9.574	
3/12/2020	13:45	19.043	18.914	90.654	9.573	
3/12/2020	13:46	19.042	18.907	90.654	9.567	

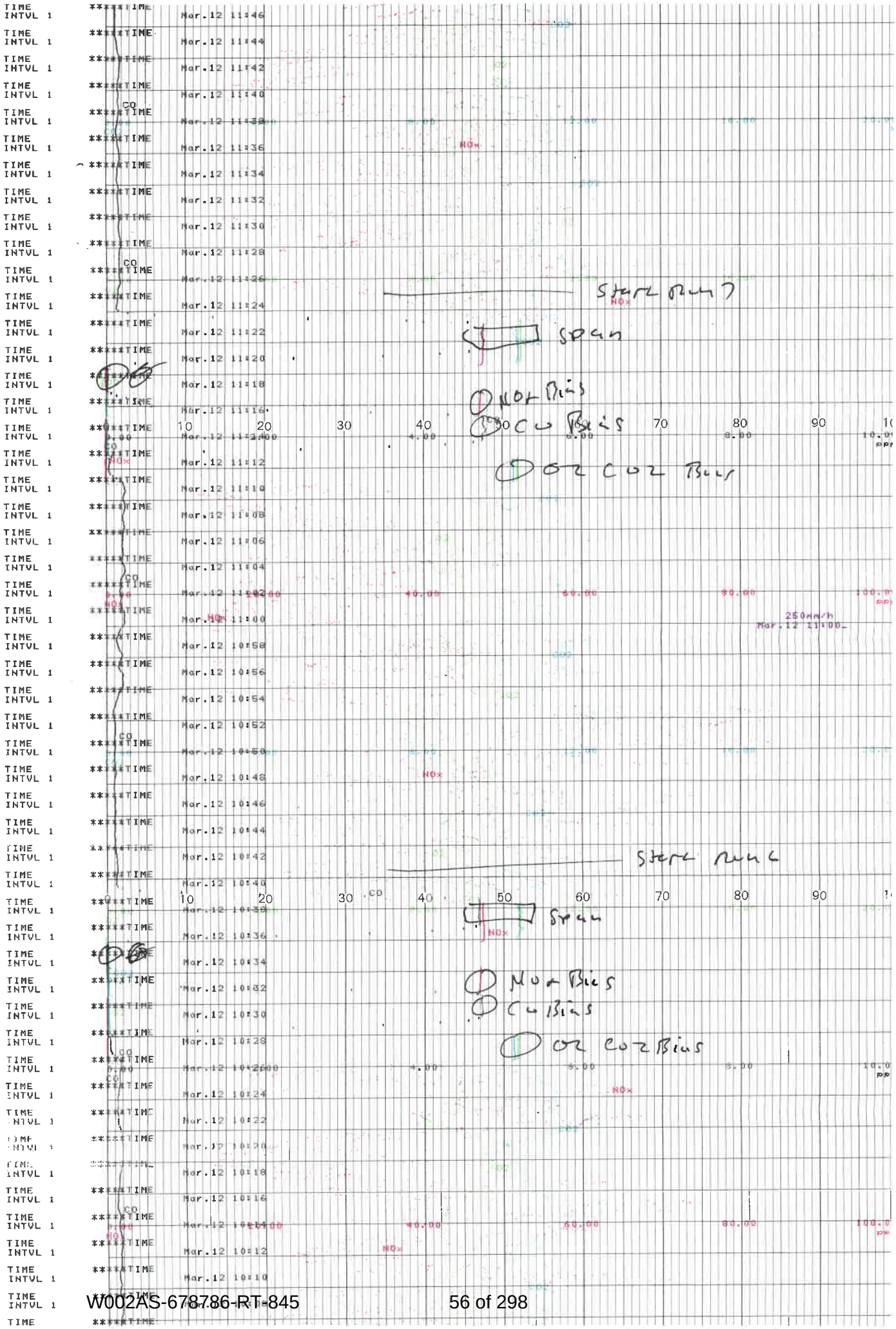
Appendix A.1.3
Unit 1 Instrument Strip Chart Data

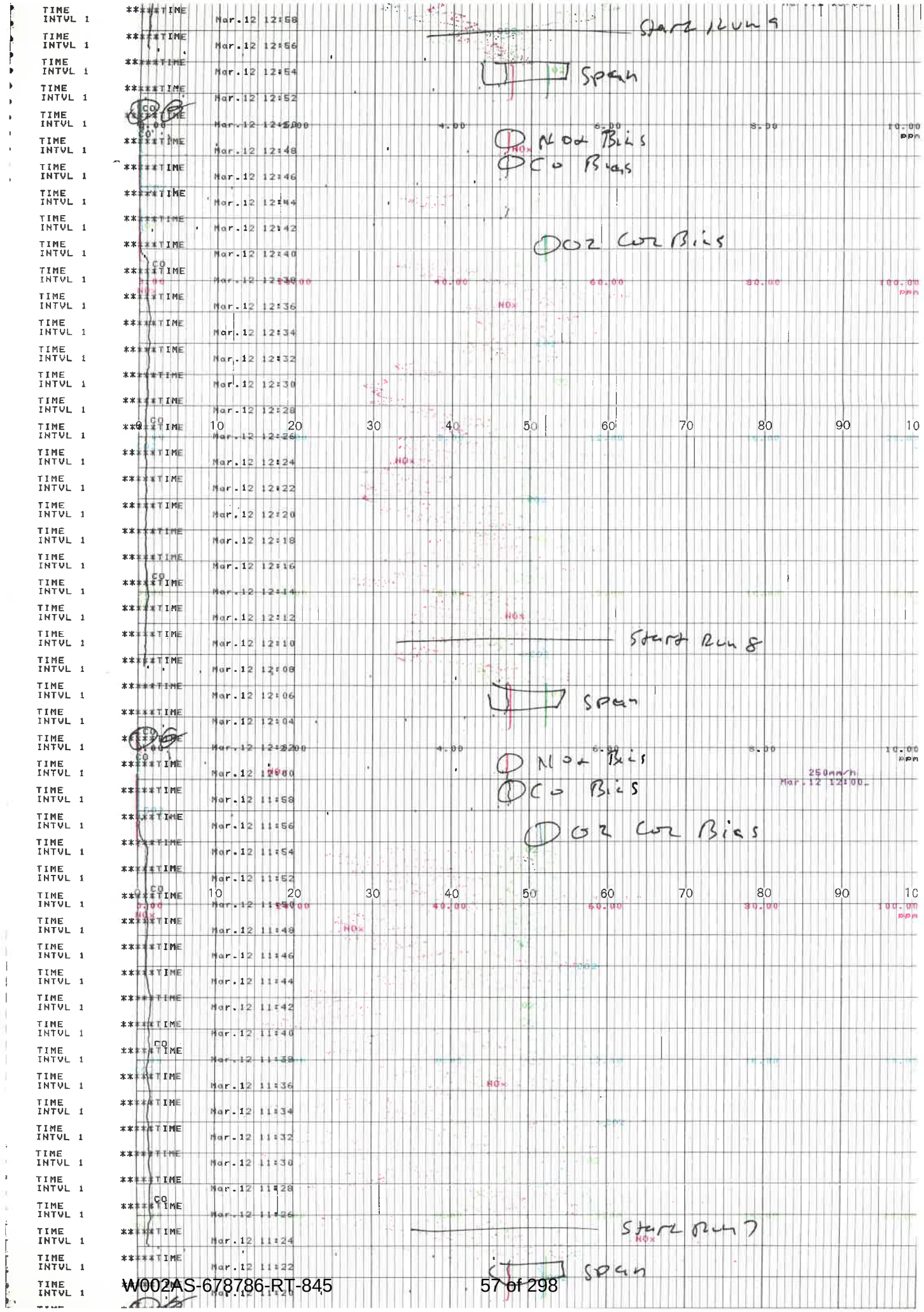

NOx Bias
CO Bias
O2 CO2 Bias
Start Run
NOx Bias
CO Bias
O2 CO2 Bias
NOx Gas Normal
NOx Gas Normal mode
NOx mod
Mid
High
Desert View Power Unit 1 RATA

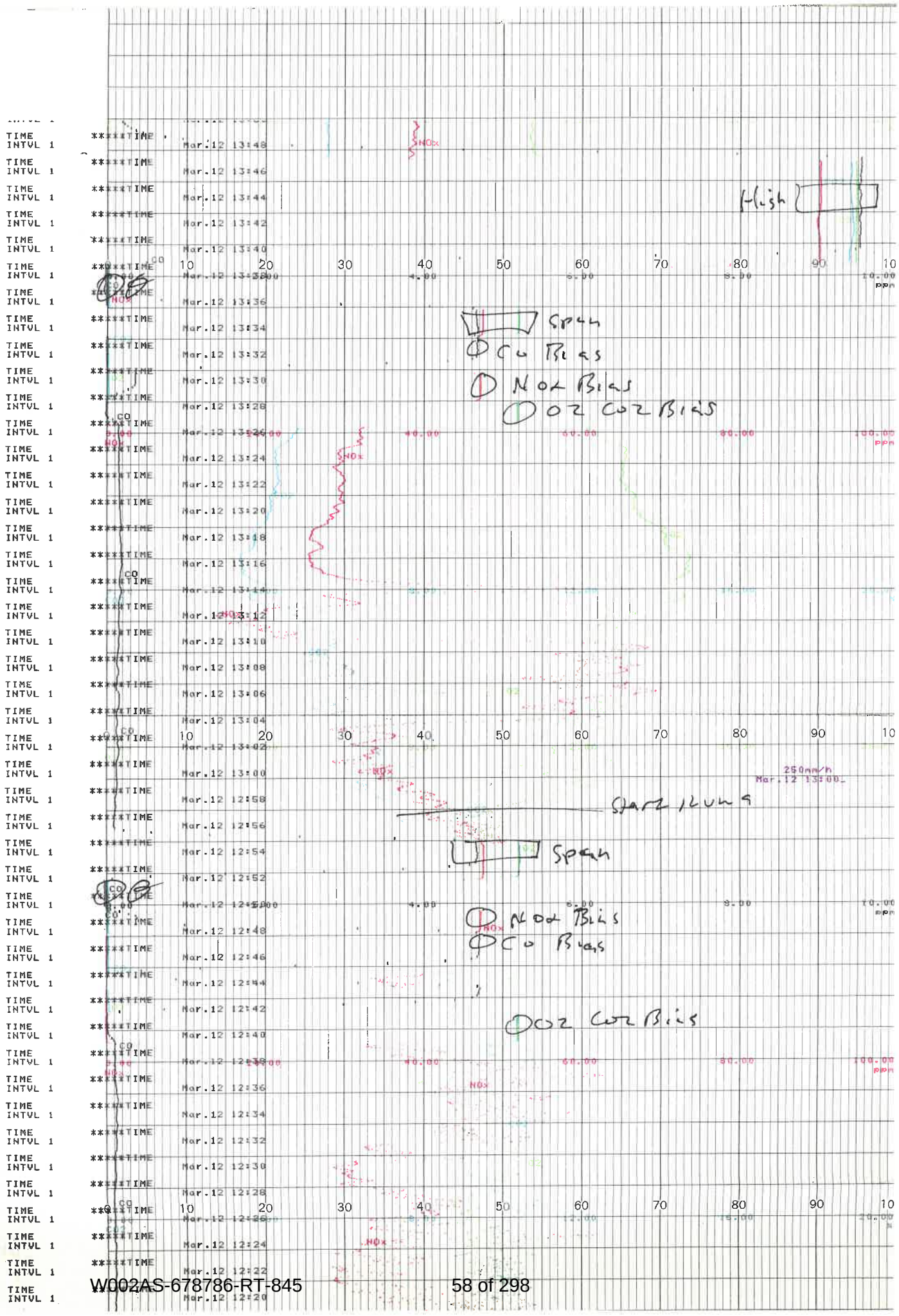

TIME INTVL 1
Mar.12 08:16
Mar.12 08:14
Mar.12 08:12
Mar.12 08:10
Mar.12 08:08
Mar.12 08:06
Mar.12 08:04
Mar.12 08:02
Mar.12 08:00
Mar.12 07:58
Mar.12 07:56
Mar.12 07:54
Mar.12 07:52
Mar.12 07:50
Mar.12 07:48
Mar.12 07:46
Mar.12 07:44
Mar.12 07:42
Mar.12 07:40
Mar.12 07:38
Mar.12 07:36
Mar.12 07:34
Mar.12 07:32
Mar.12 07:30
Mar.12 07:28
Mar.12 07:26
Mar.12 07:24
Mar.12 07:22
Mar.12 07:20
Mar.12 07:18
Mar.12 07:16
Mar.12 07:14
Mar.12 07:12
Mar.12 07:10
Mar.12 07:08
Mar.12 07:06
Mar.12 07:04
Mar.12 07:02
Mar.12 07:00
Mar.12 06:58
Mar.12 06:56
Mar.12 06:54
Mar.12 06:52
Mar.12 06:50
Mar.12 06:48
Mar.12 06:46
Mar.12 06:44
Mar.12 06:42
CO
NOx
250mm/h
Mar.12 08:00
Mar.12 07:00
Start Run 2
Span
Start Run 1
NOx Bias
CO Bias
O2 CO2 Bias


Start Run 4
Span
NOx Bias
CO Bias
O2 CO2 Bias
Start Run 3
Span
NOx Bias
CO Bias
O2 CO2 Bias
Start Run 2
250mm/h
Mar.12 09:00
Mar.12 08:00
ppm


NOx Bias
CO Bias
O2 CO2 Bias
Start Run 5
Span
NOx Bias
CO Bias
O2 CO2 Bias
DELTA 3-CEMS
Start Run 4
Span
NOx Bias
CO Bias
O2 CO2 Bias
250mm/h
Mar.12 10:00
250mm/h
Mar.12 09:00
CO
NOx
ppm
TIME
INTVL 1


Start Run 7
Span
NOx Bias
CO Bias
O2 CO2 Bias
Start Run 6
Span
NOx Bias
CO Bias
O2 CO2 Bias
250 mm/h
Mar.12 11:00


Start Run 9
Span
NOx Bias
CO Bias
O2 Cor Bias
Start Run 8
Span
NOx Bias
CO Bias
O2 Cor Bias
Start Run 7
Span
250mm/h
Mar.12 12:00
TIME INTVL 1
CO
NOx
ppm


TIME INTVL 1
Mar.12 13:48
Mar.12 13:46
Mar.12 13:44
Mar.12 13:42
Mar.12 13:40
Mar.12 13:38
Mar.12 13:36
Mar.12 13:34
Mar.12 13:32
Mar.12 13:30
Mar.12 13:28
Mar.12 13:26
Mar.12 13:24
Mar.12 13:22
Mar.12 13:20
Mar.12 13:18
Mar.12 13:16
Mar.12 13:14
Mar.12 13:12
Mar.12 13:10
Mar.12 13:08
Mar.12 13:06
Mar.12 13:04
Mar.12 13:02
Mar.12 13:00
Mar.12 12:58
Mar.12 12:56
Mar.12 12:54
Mar.12 12:52
Mar.12 12:50
Mar.12 12:48
Mar.12 12:46
Mar.12 12:44
Mar.12 12:42
Mar.12 12:40
Mar.12 12:38
Mar.12 12:36
Mar.12 12:34
Mar.12 12:32
Mar.12 12:30
Mar.12 12:28
Mar.12 12:26
Mar.12 12:24
Mar.12 12:22
Mar.12 12:20
CO
NOx
O2
ppm
250mm/h
High
Spark
CO Bias
NOx Bias
O2 CO2 Bias
Start Burn
Spark
NOx Bias
CO Bias
O2 CO2 Bias

Appendix A.1.4
Unit 1 SO_2 Data and Velocity Data

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman
TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92
TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 1 Ps: 4.38
Start: 0700 Stop: 0730

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.6	353	5	1.3	357	5	.98	355
4, 45.9"	1.4	355	4	1.0	358	4	.91	356
3, 36.5"	1.3	356	3	1.0	358	3	.85	357
2, 27.1"	1.2	357	2	.98	357	2	.87	358
1, 17.7	1.1	358	1	.95	356	1	.90	356
5	1.1	356	5	.94	355	5	1.1	356
4	1.2	357	4	.93	356	4	.95	355
3	1.1	358	3	.88	357	3	1.0	357
2	1.2	359	2	.94	358	2	.97	358
1	1.1	358	1	1.0	358	1	1.2	357

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C
1	253	254		306	20.7
2	252	251			
3	255	257			

MOISTURE DATA FOR TEST RUNS 1 THROUGH 1

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0700	98.700	2.5	79	N/A	60	10"	#1	H_2O_2	842.6	717.4	
0710	107.455	2.5	80		56	10"	#2	H_2O_2	625.2	621.9	
0720	116.165	2.5	85		57	10"	#3	Empty	651.6	649.5	
0730	124.996						#4	Silica Gel	949.9	940.0	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman
TEST DATE: 3/12/2020
BAR. PRESSURE: 29.97
TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓
LEVEL: ✓
LEAK CHECK PRE- ✓
POST- ✓

Run #: 2
Ps: 4.38
Start: 0743
Stop: 0813

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.5	354	5	1.3	357	5	1.0	355
4, 45.9"	1.4	355	4	1.1	358	4	.92	356
3, 36.5"	1.2	356	3	.99	359	3	.83	357
2, 27.1"	1.1	357	2	.97	360	2	.85	358
1, 17.7	1.0	357	1	.95	358	1	.88	358
5	1.4	358	5	.96	358	5	1.0	357
4	1.3	358	4	.92	359	4	.94	358
3	1.1	359	3	.90	360	3	.99	357
2	1.1	358	2	.95	361	2	.96	358
1	1.1	357	1	1.1	360	1	1.0	355

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	256	255		307	00.7			
2	253	259						
3	256	253						

MOISTURE DATA FOR TEST RUNS 2 THROUGH 2

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0743	126.500	2.5	85	N/A	57	10"	#1	H_2O_2	858.3	730.1	
0753	135.260	2.5	88		53	10"	#2	H_2O_2	685.6	683.4	
0803	144.010	2.5	88		52	10"	#3	Empty	606.2	605.9	
0813	152.744						#4	Silica Gel	1048.0	1041.6	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.005 CFM @ 20 in. Hg., Post-Test Leak Check: 0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman
TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92
TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 3 Ps: 7.38
Start: 0829 Stop: 0859

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.6	358	5	1.4	355	5	1.1	355
4, 45.9"	1.3	360	4	1.0	358	4	.94	356
3, 36.5"	1.1	361	3	.98	359	3	.85	357
2, 27.1"	1.1	360	2	98	360	2	.82	358
1, 17.7	1.0	361	1	.93	358	1	.87	357
5	1.4	355	5	.97	355	5	1.2	355
4	1.2	355	4	.91	358	4	.93	356
3	1.2	360	3	.87	359	3	.98	358
2	1.0	361	2	.99	359	2	.95	357
1	1.0	360	1	1.0	357	1	.99	352
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	253	215		306	20.7			
2	257	253						
3	253	258						

MOISTURE DATA FOR TEST RUNS 3 THROUGH 3

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0829	154.000	2.5	86	N/A	55	10"	#1	H_2O_2	866.1	778.6	
0839	162.785	2.5	90		44	10"	#2	H_2O_2	656.0	654.0	
0849	171.575	2.5	93		48	10"	#3	Empty	651.7	651.6	
0859	180.471						#4	Silica Gel	951.8	949.9	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.003 CFM @ 20 in. Hg., Post-Test Leak Check: 0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power | LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman | TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92 | TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS | TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer | PITOT TUBE ID: #043 | Cp: 0.84
ZERO: ✓ LEVEL: ✓ | LEAK CHECK PRE- ✓ POST- ✓

Run #: 4 Ps: -.38
Start: 0913 Stop: 0943

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.5	355	5	1.3	354	5	1.2	356
4, 45.9"	1.4	356	4	1.1	355	4	.93	357
3, 36.5"	1.3	358	3	1.0	356	3	.84	358
2, 27.1"	1.1	357	2	.95	357	2	.81	358
1, 17.7	1.0	355	1	.91	358	1	.85	355
5	1.3	356	5	.93	355	5	1.3	354
4	1.2	357	4	.94	356	4	.92	353
3	1.1	358	3	.85	357	3	.97	352
2	1.1	356	2	.96	355	2	.96	353
1	1.0	355	1	.99	354	1	1.0	354

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C
1	258	257		308	02.7
2	255	253			
3	251	256			

MOISTURE DATA FOR TEST RUNS 4 THROUGH 4

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0913	182.000	2.5	91	N/A	46	10"	#1	H_2O_2	889.1	765.5	
0923	190.865	2.5	91		51	10"	#2	H_2O_2	676.7	675.8	
0933	199.715	2.5	93		57	10"	#3	Empty	607.0	606.5	
0943	208.654						#4	Silica Gel	1054.6	1048.0	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman
TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92
TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 5 Ps: 4.38
Start: 0957 Stop: 1027

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.6	355	5	1.2	354	5	1.2	353
4, 45.9"	1.4	356	4	1.2	355	4	.91	354
3, 36.5"	1.2	357	3	1.1	356	3	.82	355
2, 27.1"	1.1	358	2	.94	357	2	.80	356
1, 17.7	1.1	357	1	.93	358	1	.86	357
5	1.4	356	5	.96	356	5	1.4	358
4	1.3	358	4	.92	355	4	.94	359
3	1.1	359	3	.88	354	3	.99	359
2	1.0	360	2	.97	353	2	.95	358
1	1.0	359	1	.96	352	1	1.0	357
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	256	255		303	027			
2	257	258						
3	251	253						

MOISTURE DATA FOR TEST RUNS 5 THROUGH 5

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0957	210.000	2.5	93	N/A	51	10"	#1	H_2O_2	760.3	633.9	
1007	218.695	2.5	93		50	10"	#2	H_2O_2	729.7	728.0	
1017	227.540	2.5	92		54	10"	#3	Empty	649.8	649.8 ~~651.8~~	0.53/10/20
1027	236.416						#4	Silica Gel	956.7	951.8	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.002 CFM @ 20 in. Hg., Post-Test Leak Check: 0.003 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman
TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92
TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 6 Ps: 6.38
Start: 1041 Stop: 1111

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.5	356	5	1.3	356	5	1.2	355
4, 45.9"	1.5	356	4	1.2	355	4	.96	353
3, 36.5"	1.3	358	3	1.0	356	3	.81	355
2, 27.1"	1.1	357	2	.97	356	2	.83	355
1, 17.7	1.0	356	1	.92	354	1	.88	354
	~~1.~~ RH 3-12-20							
5	1.3	355	5	.99	356	5	1.3	359
4	1.3	354	4	.90	355	4	.96	358
3	1.2	354	3	.87	355	3	.95	356
2	1.0	353	2	.94	352	2	.98	356
1	1.0	354	1	.99	351	1	1.1	357
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	257	259		306	02.7			
2	253	255						
3	255	257						

MOISTURE DATA FOR TEST RUNS 6 THROUGH 6

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1041	237.600	2.5	92	N/A	51	10"	#1	H_2O_2	856.6	731.6	
1051	246.305	2.5	87	|	53	10"	#2	H_2O_2	687.5	686.0	
1101	254.995	2.5	87	|	54	10"	#3	Empty	607.1	606.9	
1111	263.680			|			#4	Silica Gel	1060.5	1054.5	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.005 CFM @ 20 in. Hg., Post-Test Leak Check: 0.005 CFM @ 21 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power | LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman | TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92 | TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS | TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer | PITOT TUBE ID: #043 | Cp: 0.84
ZERO: ✓ LEVEL: ✓ | LEAK CHECK PRE- ✓ POST- ✓

Run #: 7 Ps: 4.38
Start: 1125 Stop: 1155

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.4	356	5	1.2	357	5	1.2	356
4, 45.9"	1.5	357	4	1.3	358	4	.93	356
3, 36.5"	1.2	355	3	1.0	357	3	.87	358
2, 27.1"	1.1	355	2	.94	357	2	.85	357
1, 17.7	1.1	354	1	.84	355	1	.84	356
5	1.3	356	5	.97	356	5	1.2	358
4	1.2	352	4	.93	354	4	.98	358
3	1.2	354	3	.90	355	3	.94	357
2	1.0	351	2	.92	352	2	.97	355
1	1.1	354	1	.96	353	1	1.2	356
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	257	254		298	00.6			
2	255	252						
3	256	251						

MOISTURE DATA FOR TEST RUNS 7 THROUGH 7

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1125	264.400	2.5	87	N/A	55	10"	#1	H_2O_2	767.0	636.0	
1135	273.685	2.5	85		48	10"	#2	H_2O_2	748.0	745.7	
1145	282.600	2.5	84		50	10"	#3	Empty	649.2	648.1	
1155	291.416						#4	Silica Gel	961.9	956.7	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 22 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power | LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman | TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92 | TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS | TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer | PITOT TUBE ID: #043 | Cp: 0.84
ZERO: ✓ LEVEL: ✓ | LEAK CHECK PRE- ✓ POST- ✓

Run #: 8 Ps: 8.38
Start: 1210 Stop: 1240

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.5	357	5	1.3	354	5	1.3	357
4, 45.9"	1.4	355	4	1.2	352	4	.94	358
3, 36.5"	1.1	357	3	1.0	353	3	.91	356
2, 27.1"	1.2	354	2	.90	354	2	.82	356
1, 17.7	1.1	355	1	.87	354	1	.85	356
5	1.2	356	5	.99	358	5	1.2	357
4	1.3	357	4	.91	357	4	.99	354
3	1.1	354	3	.88	357	3	.95	355
2	1.1	354	2	.96	355	2	.96	356
1	1.1	355	1	.94	356	1	1.1	355

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	253	255		306	20.6			
2	256	251						
3	254	253						

MOISTURE DATA FOR TEST RUNS 8 THROUGH 8

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1210	292.200	2.5	81	81	57	10"	#1	H_2O_2	880.0	740.4	
1220	300.945	2.5	80		51	10"	#2	H_2O_2	685.9	685.6	
1230	309.820	2.5	78		58	10"	#3	Empty	607.4	607.1	
1240	318.437						#4	Silica Gel	1065.8	1060.5	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 21 in. Hg., Post-Test Leak Check: <0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power LOCATION/UNIT: Unit - 1
PERFORMED BY: Patrick Whitman TEST DATE: 3/12/2020
BAR. PRESSURE: 29.92 TC READOUT ID: 40-WCS
DP INDICATOR ID: 40-WCS TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer PITOT TUBE ID: #043 Cp: 0.84
ZERO: ✓ LEVEL: ✓ LEAK CHECK PRE- ✓ POST- ✓

Run #: 9 Ps: -.38
Start: 1257 Stop: 1327

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.6	357	5	1.2	356	5	1.2	356
4, 45.9"	1.3	355	4	1.2	352	4	.94	357
3, 36.5"	1.2	355	3	1.0	355	3	.86	352
2, 27.1"	1.2	354	2	.91	354	2	.80	352
1, 17.7	1.1	356	1	.92	352	1	.81	355
5	1.4	357	5	.97	355	5	1.3	358
4	1.2	356	4	.91	355	4	.97	357
3	1.1	352	3	.85	351	3	.94	354
2	1.1	353	2	.98	352	2	.96	351
1	1.0	351	1	.94	353	1	1.1	353
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	257	252		302	00.6			
2	253	251						
3	256	255						

MOISTURE DATA FOR TEST RUNS 9 THROUGH 9

METER ID: 17-WCS METER Yd: 1.002 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1257	319.500	2.5	81	N/A	56	10"	#1	H_2O_2	725.0	602.8	
1307	328.285	2.5	77		51	10"	#2	H_2O_2	716.3	714.5	
1317	337.045	2.5	74		53	10"	#3	Empty	649.2	648.6	
1327	345.928						#4	Silica Gel	968.7	961.9	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 21 in. Hg

MONTROSE

SULFATE TITRATION

Project #
Client/Location DVP
Sample Location Unit 1
Titrant Used 0.01 N $BaCl_2$

Sample Date 3/12/20
Analysis Date 3/12/20
Analyst Initials

Test Number	Sample Description	Total Vol (ml) (TV)	V_{recon}	V_{evap}	Aliquot Vol (ml) (Va)	Titrant Volume (ml) (Vt)	X-Blank Vol (ml)	Comments	mg/Sample
Blank (V_b): 20 mL 3% H_2O_2 + 80 mL IPA					20 ml	0.04 / 0.05	0.05	Use w/ sample	
Blank (V_b): 20 mL DI H_2O + 80 mL IPA					20 ml	0.05 / 0.05	0.05	Use w/ standard N = (0.02*Va)/Vt	
Standardization: 15 ml DI H_2O + 5 ml 0.0200 N H_2SO_4 + 80 mL IPA					5 ml	10.39 / 10.38	10.34	N= 0.0096712	
Audit Sample: 5 ml 1000 ppm SO_4 + 15 DI H_2O + 80 mL IPA					5 ml	10.45 / 10.44	10.40	96.6 % recovery	4.83 mg / 5.0 mg
1-Sox	Ty Cobb	473			20 ml	2.48 / 2.49	2.44		
2-Sox	Ty Cobb	422			20 ml	2.54 / 2.58	2.51		
3-Sox	Ty Cobb	490			20 ml	2.22 / 2.25	2.19		
4-Sox	Ty Cobb	463			20 ml	1.82 / 1.78	1.75		
5-Sox	Ty Cobb	443			20 ml	2.08 / 2.09	2.04		
6-Sox	Ty Cobb	415			20 ml	2.64 / 2.65	2.60		
7-Sox	Ty Cobb	465			20 ml	1.67 / 1.64	1.61		
8-Sox	Ty Cobb	423			20 ml	2.12 / 2.14	2.08		
9-Sox	Ty Cobb	366			20 ml	0.14 / 0.14	0.09		
9-Sox	Repeat				20 ml	0.20 / 0.21	0.16		
					mg $H_2SO_4 \cdot 2H_2O$ = (Vt-Vbl) (N) (67) (TV/V_{evap}) (V_{recon}/Va)				

Method of Sample Prep/Analysis Notes

DS1580127

Appendix A.1.5
Unit 1 Plant Data

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 7:01	45.18	67.9	29.75	9.74	14.64	8.92	3.18	15.03 <56>	4.01 <56>	11.77	8.99	5516	4.78	1.27
3/12/2020 7:02	58.06	84.91	39.93	10.76	15.74	10.29	3.32	14.62 <56>	4.19 <56>	11.99	8.66	5760	4.86	1.39
3/12/2020 7:03	46.18	72.7	29.24	8.92	14.04	7.86	3.09	15.74 <56>	3.85 <56>	11.21	9.53	5304	4.86	1.19
3/12/2020 7:04	38.27	63.02	23.94	8.3	13.67	7.22	2.98	16.47 <56>	3.81 <56>	10.72	10.03	5239	4.91	1.13
3/12/2020 7:05	37.76	58.32	24.38	7.55	11.66	6.78	2.92	15.44 <56>	3.93 <56>	11.47	9.31	5408	4.51	1.15
3/12/2020 7:06	55.11	83.95	37.13	10.04	15.29	9.41	3.05	15.23 <56>	4.10 <56>	11.52	9.15	5644	4.65	1.25
3/12/2020 7:07	33.35	56.42	20.62	7.57	12.81	6.51	2.91	16.92 <56>	3.76 <56>	10.44	10.32	5180	4.92	1.10
3/12/2020 7:08	18.64	32.52	11.53	5.68	9.91	4.89	2.93	17.45 <56>	3.77 <56>	10.16	10.64	5182	5.11	1.10
3/12/2020 7:09	19.39	32.38	12.32	5.06	8.45	4.47	3.02	16.70 <56>	3.87 <56>	10.67	10.18	5320	5.04	1.17
3/12/2020 7:10	29.18	48.63	18.45	5.79	9.65	5.09	2.8	16.67 <56>	3.85 <56>	10.63	10.16	5297	4.67	1.08
3/12/2020 7:11	35.43	55.34	24.28	6.32	9.87	6.02	2.97	15.62 <56>	4.17 <56>	11.28	9.44	5739	4.64	1.24
3/12/2020 7:12	25.67	42.55	16.36	5.65	9.36	5.01	2.85	16.57 <56>	3.88 <56>	10.7	10.1	5339	4.72	1.11
3/12/2020 7:13	34.8	54.88	22.84	5.58	8.80	5.1	2.92	15.77 <56>	4.00 <56>	11.29	9.55	5498	4.61	1.17
3/12/2020 7:14	52.91	76.07	37.88	6.85	9.85	6.82	3	14.38 <56>	4.36 <56>	12.24	8.45	5997	4.31	1.31
3/12/2020 7:15	51.17	78.02	33.76	7.58	11.56	6.96	3.02	15.25 <56>	4.02 <56>	11.6	9.16	5526	4.60	1.21
3/12/2020 7:16	51.48	78.42	34.26	6.87	10.47	6.36	2.96	15.23 <56>	4.05 <56>	11.57	9.15	5575	4.51	1.20
3/12/2020 7:17	39.41	65.2	24.36	6.45	10.67	5.55	2.88	16.54 <56>	3.76 <56>	10.72	10.08	5177	4.76	1.08
3/12/2020 7:18	42.19	63.36	28.4	6.01	9.03	5.63	3.08	15.02 <56>	4.10 <56>	11.79	8.98	5639	4.63	1.26
3/12/2020 7:19	48.87	73.39	32.61	8.83	13.26	8.2	3.12	15.02 <56>	4.06 <56>	11.74	8.98	5590	4.69	1.27
3/12/2020 7:20	59.62	84.9	41.97	12.01	17.1	11.76	3.26	14.24 <56>	4.29 <56>	12.4	8.33	5897	4.64	1.40
3/12/2020 7:21	52.34	83.58	32.9	13.15	21	11.5	2.98	15.97 <56>	3.83 <56>	11.04	9.69	5265	4.76	1.14
3/12/2020 7:22	41.41	64.4	26.55	10.11	15.72	9.02	3.13	15.55 <56>	3.90 <56>	11.4	9.39	5370	4.87	1.22
3/12/2020 7:23	50.19	75.24	33.02	12.12	18.17	11.09	3.12	14.99 <56>	4.00 <56>	11.81	8.96	5510	4.68	1.25
3/12/2020 7:24	57.35	85.76	38.42	13.49	20.17	12.58	3.18	14.95 <56>	4.08 <56>	11.75	8.93	5612	4.76	1.30
3/12/2020 7:25	40.99	68.19	25.34	11.13	18.52	9.57	3.12	16.64 <56>	3.76 <56>	10.65	10.14	5178	5.19	1.17
3/12/2020 7:26	20.73	34.17	12.78	8.42	13.88	7.22	3.05	16.48 <56>	3.75 <56>	10.82	10.04	5163	5.03	1.14
3/12/2020 7:27	30.14	46.91	19.79	9.07	14.12	8.28	3.15	15.57 <56>	4.00 <56>	11.36	9.4	5499	4.90	1.26
3/12/2020 7:28	30.12	46.56	19.55	9.1	14.07	8.22	3.1	15.46 <56>	3.95 <56>	11.47	9.32	5436	4.79	1.22
3/12/2020 7:29	43.76	63.58	30.07	10.71	15.56	10.24	3.19	14.53 <56>	4.18 <56>	12.13	8.58	5755	4.63	1.33
3/12/2020 7:30	50.42	72.32	34.59	12.71	18.23	12.13	3.24	14.34 <56>	4.18 <56>	12.33	8.42	5747	4.65	1.35
Average	**41.34**	**63.79**	**27.23**	**8.72**	**13.51**	**7.96**	**3.05**			**11.36**	**9.40**	**5478.73**	**4.76**	**1.22**

Flow	kdscfh	5478.73
O2	% dry	9.40
CO2	% dry	11.36
NOx	ppm dry	41.34
NOx	ppm @ 3% O2	63.79
NOx	lb/hr	27.23
SO2	ppm dry	8.72
SO2	ppm @ 3% O2	13.51
SO2	lb/hr	7.96
CO	ppm dry	3.05
CO	ppm @ 3% O2	4.76
CO	lb/hr	1.22

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 7:44	32.27	54.86	20.31	7.23	12.29	6.33	3.04	17.00 <56>	3.83 <56>	10.45	10.37	5271	5.17	1.16
3/12/2020 7:45	39.92	60.81	27.38	7.48	11.4	7.14	3.03	15.23 <56>	4.17 <56>	11.65	9.15	5744	4.62	1.26
3/12/2020 7:46	51.11	77.07	34.52	9.5	14.33	8.93	3.04	15.08 <56>	4.11 <56>	11.75	9.03	5657	4.58	1.25
3/12/2020 7:47	49.42	79.98	32	9.85	15.94	8.87	3.12	16.18 <56>	3.94 <56>	10.87	9.84	5423	5.05	1.23
3/12/2020 7:48	28.8	50.1	17.58	6.66	11.59	5.66	2.8	17.40 <56>	3.72 <56>	10.24	10.61	5114	4.87	1.04
3/12/2020 7:49	42.28	64.08	28.93	7.87	11.93	7.49	3.05	15.16 <56>	4.16 <56>	11.7	9.09	5731	4.62	1.27
3/12/2020 7:50	56.44	86.87	37.69	10.72	16.5	9.96	3.1	15.39 <56>	4.06 <56>	11.49	9.27	5593	4.77	1.26
3/12/2020 7:51	55.26	82.36	37.51	10.22	15.23	9.65	3	14.90 <56>	4.13 <56>	11.86	8.89	5686	4.47	1.24
3/12/2020 7:52	61.89	90.81	42.02	13	19.07	12.28	3.03	14.67 <56>	4.13 <56>	12.04	8.7	5687	4.45	1.25
3/12/2020 7:53	51.69	81.59	33.11	12.08	19.07	10.77	2.86	15.78 <56>	3.90 <56>	11.17	9.56	5366	4.51	1.12
3/12/2020 7:54	33.75	54.62	21.1	8.27	13.38	7.19	2.83	16.18 <56>	3.81 <56>	10.96	9.84	5237	4.58	1.08
3/12/2020 7:55	32.79	52.59	21.01	7.78	12.48	6.93	2.85	16.04 <56>	3.90 <56>	11.06	9.74	5366	4.57	1.11
3/12/2020 7:56	33.11	53.59	21	7.4	11.98	6.53	2.84	16.18 <56>	3.86 <56>	10.95	9.84	5312	4.60	1.10
3/12/2020 7:57	36.98	59.74	23.35	7.58	12.25	6.66	2.97	16.16 <56>	3.84 <56>	10.97	9.82	5288	4.80	1.14
3/12/2020 7:58	41.35	63.64	28.06	8.28	12.74	7.82	2.83	15.39 <56>	4.13 <56>	11.45	9.27	5685	4.36	1.17
3/12/2020 7:59	27.61	47.7	16.75	6.91	11.94	5.83	2.78	17.28 <56>	3.69 <56>	10.31	10.54	5082	4.80	1.03
3/12/2020 8:00	30.8	49.01	19.85	6.37	10.14	5.71	2.87	15.91 <56>	3.92 <56>	11.16	9.65	5398	4.57	1.13
3/12/2020 8:01	49.65	71.85	35.49	8.76	12.68	8.71	2.95	14.47 <56>	4.35 <56>	12.19	8.53	5987	4.27	1.28
3/12/2020 8:02	51.57	79.03	32.96	9.97	15.28	8.86	2.74	15.33 <56>	3.89 <56>	11.57	9.22	5353	4.20	1.07
3/12/2020 8:03	70.51	100.81	49.89	14.54	20.79	14.31	2.88	14.30 <56>	4.31 <56>	12.28	8.38	5927	4.12	1.24
3/12/2020 8:04	39.11	64.52	23.7	9.48	15.64	7.99	2.56	16.50 <56>	3.69 <56>	10.74	10.05	5076	4.22	0.94
3/12/2020 8:05	36.96	57.78	23.87	7.71	12.05	6.93	2.49	15.63 <56>	3.93 <56>	11.34	9.45	5409	3.89	0.98
3/12/2020 8:06	40.83	62.63	26.68	8.25	12.65	7.5	2.61	15.34 <56>	3.98 <56>	11.51	9.23	5474	4.00	1.04
3/12/2020 8:07	41.36	63.28	27.14	8.88	13.59	8.11	2.52	15.30 <56>	3.99 <56>	11.55	9.2	5497	3.86	1.01
3/12/2020 8:08	37.96	60.18	24.22	8.03	12.73	7.13	2.47	15.85 <56>	3.88 <56>	11.13	9.61	5345	3.92	0.96
3/12/2020 8:09	28.49	47.35	17.35	6.56	10.9	5.56	2.46	16.62 <56>	3.71 <56>	10.71	10.13	5102	4.09	0.91
3/12/2020 8:10	37.92	58.62	24.93	7.1	10.97	6.49	2.45	15.46 <56>	4.00 <56>	11.41	9.32	5507	3.79	0.98
3/12/2020 8:11	37.69	58.11	24.51	7.16	11.04	6.48	2.39	15.42 <56>	3.96 <56>	11.44	9.29	5446	3.68	0.95
3/12/2020 8:12	41.06	63.03	26.9	7.62	11.7	6.95	2.38	15.35 <56>	3.99 <56>	11.51	9.24	5488	3.65	0.95
3/12/2020 8:13	31.79	52.25	19.67	6.72	11.05	5.79	2.41	16.44 <56>	3.77 <56>	10.77	10.01	5184	3.96	0.91
Average	**41.68**	**64.96**	**27.32**	**8.60**	**13.44**	**7.82**	**2.78**			**11.27**	**9.50**	**5447.83**	**4.37**	**1.10**

Flow	kdscfh	5447.83
O2	% dry	9.50
CO2	% dry	11.27
NOx	ppm dry	41.68
NOx	ppm @ 3% O2	64.96
NOx	lb/hr	27.32
SO2	ppm dry	8.60
SO2	ppm @ 3% O2	13.44
SO2	lb/hr	7.82
CO	ppm dry	2.78
CO	ppm @ 3% O2	4.37
CO	lb/hr	1.10

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 8:30	39.88	62.18	25.74	8.23	12.83	7.39	2.17	15.59 <56>	3.93 <56>	11.31	9.42	5407	3.38	0.85
3/12/2020 8:31	39.58	63.14	25.45	7.49	11.95	6.7	2.22	15.95 <56>	3.91 <56>	11	9.68	5386	3.54	0.87
3/12/2020 8:32	33.68	55.36	20.93	6.54	10.75	5.66	2.13	16.44 <56>	3.78 <56>	10.79	10.01	5206	3.50	0.81
3/12/2020 8:33	41.18	64.6	26.68	7.19	11.28	6.48	2.27	15.69 <56>	3.94 <56>	11.31	9.49	5427	3.56	0.90
3/12/2020 8:34	42.64	65.85	28.24	7.95	12.28	7.33	2.22	15.44 <56>	4.03 <56>	11.38	9.31	5548	3.43	0.90
3/12/2020 8:35	41.85	64.14	27.19	7.94	12.17	7.18	2.06	15.33 <56>	3.95 <56>	11.59	9.22	5441	3.16	0.81
3/12/2020 8:36	59.9	89.28	39.65	11.8	17.59	10.87	2.17	14.90 <56>	4.03 <56>	11.79	8.89	5545	3.23	0.87
3/12/2020 8:37	52.77	78.91	35.03	10.42	15.58	9.63	2.24	14.95 <56>	4.04 <56>	11.73	8.93	5561	3.35	0.91
3/12/2020 8:38	42.53	67.13	26.7	8.57	13.53	7.49	2.08	15.78 <56>	3.82 <56>	11.19	9.56	5259	3.28	0.79
3/12/2020 8:39	42.74	70.38	26.12	8.86	14.59	7.53	1.95	16.47 <56>	3.72 <56>	10.71	10.03	5118	3.21	0.73
3/12/2020 8:40	31.49	52.29	19.71	6.87	11.41	5.98	2	16.60 <56>	3.81 <56>	10.61	10.12	5242	3.32	0.76
3/12/2020 8:41	29.06	48.08	17.9	6.29	10.41	5.39	1.98	16.54 <56>	3.75 <56>	10.74	10.08	5158	3.28	0.74
3/12/2020 8:42	42.41	66.36	27.71	8.7	13.61	7.91	2.03	15.65 <56>	3.98 <56>	11.27	9.46	5473	3.18	0.81
3/12/2020 8:43	39.03	64.51	24.61	7.88	13.02	6.91	1.97	16.53 <56>	3.84 <56>	10.68	10.07	5281	3.26	0.76
3/12/2020 8:44	33.85	53.81	21.44	6.74	10.71	5.94	2.03	15.90 <56>	3.86 <56>	11.14	9.64	5305	3.23	0.78
3/12/2020 8:45	48.92	72.13	33.33	9.46	13.95	8.97	2.06	14.74 <56>	4.15 <56>	11.92	8.76	5707	3.04	0.85
3/12/2020 8:46	55.49	81.55	37.7	11.91	17.5	11.26	2.26	14.70 <56>	4.14 <56>	11.98	8.72	5691	3.32	0.93
3/12/2020 8:47	48.89	74.42	31.57	10.9	16.59	9.79	2.02	15.22 <56>	3.93 <56>	11.57	9.14	5408	3.07	0.79
3/12/2020 8:48	53.31	80.46	34.17	11.19	16.89	9.98	1.99	15.09 <56>	3.90 <56>	11.71	9.04	5369	3.00	0.78
3/12/2020 8:49	46.2	70.62	29.56	10.55	16.13	9.39	2.08	15.29 <56>	3.90 <56>	11.52	9.19	5360	3.18	0.81
3/12/2020 8:50	43.09	65.48	27.6	9.45	14.36	8.42	2	15.20 <56>	3.90 <56>	11.61	9.12	5366	3.04	0.78
3/12/2020 8:51	50.14	76.38	32.24	10.98	16.73	9.82	2.17	15.23 <56>	3.91 <56>	11.59	9.15	5386	3.31	0.85
3/12/2020 8:52	48.3	73.58	31.12	10.25	15.61	9.19	2.2	15.23 <56>	3.92 <56>	11.55	9.15	5396	3.35	0.86
3/12/2020 8:53	38.73	62.63	23.84	8.88	14.36	7.61	2.11	16.17 <56>	3.75 <56>	10.92	9.83	5156	3.41	0.79
3/12/2020 8:54	30.52	50.82	18.4	7.53	12.54	6.32	2.15	16.65 <56>	3.67 <56>	10.64	10.15	5050	3.58	0.79
3/12/2020 8:55	34.31	54.49	21.7	8.15	12.94	7.17	2.19	15.88 <56>	3.85 <56>	11.14	9.63	5297	3.48	0.84
3/12/2020 8:56	46.56	68.03	31.54	10.25	14.98	9.66	2.11	14.61 <56>	4.12 <56>	12.06	8.65	5674	3.08	0.87
3/12/2020 8:57	51.08	79.51	32.72	10.86	16.9	9.68	2.25	15.57 <56>	3.90 <56>	11.3	9.4	5366	3.50	0.88
3/12/2020 8:58	29.85	51.18	17.82	7.62	13.06	6.33	2.07	17.15 <56>	3.63 <56>	10.34	10.46	4999	3.55	0.75
3/12/2020 8:59	33.66	55.63	20.62	6.75	11.16	5.75	2.01	16.53 <56>	3.73 <56>	10.73	10.07	5130	3.32	0.75
Average	**42.39**	**66.10**	**27.23**	**8.87**	**13.85**	**7.92**	**2.11**			**11.26**	**9.48**	**5357.07**	**3.30**	**0.82**

Flow	kdscfh	5357.07
O2	% dry	9.48
CO2	% dry	11.26
NOx	ppm dry	42.39
NOx	ppm @ 3% O2	66.10
NOx	lb/hr	27.23
SO2	ppm dry	8.87
SO2	ppm @ 3% O2	13.85
SO2	lb/hr	7.92
CO	ppm dry	2.11
CO	ppm @ 3% O2	3.30
CO	lb/hr	0.82

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 9:14	43.8	68.96	27.08	8.57	13.49	7.37	2.1	15.74 <56>	3.76 <56>	11.19	9.53	5179	3.31	0.79
3/12/2020 9:15	42.61	65.53	27.3	7.62	11.72	6.79	2.14	15.38 <56>	3.90 <56>	11.5	9.26	5367	3.29	0.83
3/12/2020 9:16	39.76	62.48	24.97	7.4	11.63	6.47	2.16	15.72 <56>	3.82 <56>	11.25	9.51	5260	3.39	0.83
3/12/2020 9:17	41.84	64.12	27.2	7.33	11.23	6.63	2.26	15.33 <56>	3.96 <56>	11.49	9.22	5446	3.46	0.89
3/12/2020 9:18	34.61	53.55	22.04	6.8	10.52	6.03	2.28	15.47 <56>	3.88 <56>	11.43	9.33	5335	3.53	0.88
3/12/2020 9:19	43.2	65.76	27.93	7.47	11.37	6.72	2.39	15.22 <56>	3.94 <56>	11.56	9.14	5415	3.64	0.94
3/12/2020 9:20	40.43	60.97	26.39	7.15	10.78	6.49	2.36	15.08 <56>	3.97 <56>	11.7	9.03	5468	3.56	0.94
3/12/2020 9:21	36.09	59.87	21.57	6.34	10.52	5.27	2.26	16.59 <56>	3.64 <56>	10.63	10.11	5007	3.75	0.82
3/12/2020 9:22	52.52	74.02	36.16	8.03	11.32	7.69	2.35	14.09 <56>	4.19 <56>	12.56	8.2	5767	3.31	0.98
3/12/2020 9:23	59.71	88.4	39.63	10.33	15.29	9.54	2.34	14.81 <56>	4.04 <56>	11.82	8.81	5559	3.46	0.95
3/12/2020 9:24	34.67	55.51	21.14	6.89	11.03	5.84	2.18	16.01 <56>	3.71 <56>	11.06	9.72	5107	3.49	0.81
3/12/2020 9:25	37.12	55.37	24.31	6.83	10.19	6.22	2.27	14.92 <56>	3.99 <56>	11.82	8.9	5485	3.39	0.90
3/12/2020 9:26	48.93	70.92	32.54	7.97	11.55	7.37	2.3	14.49 <56>	4.05 <56>	12.15	8.55	5570	3.33	0.93
3/12/2020 9:27	50.37	79.86	31.15	8.38	13.29	7.21	2.29	15.85 <56>	3.76 <56>	11.03	9.61	5180	3.63	0.86
3/12/2020 9:28	29.69	47.32	18.38	5.82	9.28	5.01	2.15	15.94 <56>	3.77 <56>	11.11	9.67	5185	3.43	0.81
3/12/2020 9:29	40.03	61.61	25.61	7.03	10.82	6.26	2.19	15.39 <56>	3.89 <56>	11.46	9.27	5358	3.37	0.85
3/12/2020 9:30	41.36	64.77	26.45	7.29	11.42	6.49	2.24	15.66 <56>	3.89 <56>	11.22	9.47	5357	3.51	0.87
3/12/2020 9:31	38.43	58.59	24.66	6.91	10.54	6.17	2.19	15.25 <56>	3.91 <56>	11.59	9.16	5375	3.34	0.86
3/12/2020 9:32	51.18	74.79	34.41	9.08	13.27	8.49	2.29	14.61 <56>	4.09 <56>	12.03	8.65	5631	3.35	0.94
3/12/2020 9:33	41.61	67.28	25.34	8.63	13.95	7.31	2.27	16.17 <56>	3.71 <56>	10.9	9.83	5100	3.67	0.84
3/12/2020 9:34	33.04	50.63	21.21	6.33	9.7	5.65	2.36	15.33 <56>	3.91 <56>	11.48	9.22	5377	3.62	0.92
3/12/2020 9:35	33.62	52.93	21.05	6.33	9.97	5.51	2.29	15.74 <56>	3.81 <56>	11.21	9.53	5245	3.61	0.87
3/12/2020 9:36	32.84	51.29	20.83	6.1	9.53	5.38	2.38	15.62 <56>	3.86 <56>	11.27	9.44	5313	3.72	0.92
3/12/2020 9:37	30.09	47.08	19.19	5.88	9.2	5.22	2.19	15.65 <56>	3.88 <56>	11.31	9.46	5341	3.43	0.85
3/12/2020 9:38	30.35	46.71	19.33	6.06	9.33	5.37	2.34	15.39 <56>	3.88 <56>	11.48	9.27	5336	3.60	0.91
3/12/2020 9:39	44.47	67.69	28.77	7.64	11.63	6.88	2.45	15.22 <56>	3.94 <56>	11.54	9.14	5419	3.73	0.96
3/12/2020 9:40	36.93	57.73	23.5	6.6	10.32	5.84	2.44	15.63 <56>	3.87 <56>	11.24	9.45	5331	3.81	0.95
3/12/2020 9:41	33.4	53	20.91	4.99	7.92	4.35	2.42	15.87 <56>	3.81 <56>	11.12	9.62	5243	3.84	0.92
3/12/2020 9:42	38.59	59.19	25.12	4.61	7.07	4.18	2.39	15.34 <56>	3.96 <56>	11.52	9.23	5453	3.67	0.95
3/12/2020 9:43	38.69	59.4	24.87	4.67	7.17	4.18	2.49	15.35 <56>	3.91 <56>	11.5	9.24	5384	3.82	0.97
Average	**40.00**	**61.51**	**25.63**	**7.04**	**10.83**	**6.26**	**2.29**			**11.44**	**9.29**	**5353.10**	**3.53**	**0.89**

Flow	kdscfh	5353.10
O2	% dry	9.29
CO2	% dry	11.44
NOx	ppm dry	40.00
NOx	ppm @ 3% O2	61.51
NOx	lb/hr	25.63
SO2	ppm dry	7.04
SO2	ppm @ 3% O2	10.83
SO2	lb/hr	6.26
CO	ppm dry	2.29
CO	ppm @ 3% O2	3.53
CO	lb/hr	0.89

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 9:58	30.09	47.66	18.75	6.52	10.33	5.65	2.31	15.84 <56>	3.79 <56>	11.21	9.6	5220	3.66	0.88
3/12/2020 9:59	44.26	67.03	29.34	8.44	12.78	7.78	2.44	15.14 <56>	4.03 <56>	11.58	9.08	5552	3.70	0.98
3/12/2020 10:00	38.99	59.4	25.23	7.92	12.07	7.13	2.42	15.23 <56>	3.94 <56>	11.62	9.15	5420	3.69	0.95
3/12/2020 10:01	45.18	69.6	28.22	9.27	14.28	8.06	2.48	15.40 <56>	3.80 <56>	11.41	9.28	5232	3.62	0.94
3/12/2020 10:02	51.84	76.63	34.52	8.79	12.99	8.14	2.67	14.78 <56>	4.05 <56>	11.87	8.79	5577	3.95	1.08
3/12/2020 10:03	38	59.2	23.97	7.53	11.73	6.61	2.51	15.58 <56>	3.84 <56>	11.31	9.41	5284	3.91	0.96
3/12/2020 10:04	36.51	58.98	22.37	7.22	11.66	6.15	2.59	16.16 <56>	3.73 <56>	10.95	9.82	5132	4.18	0.97
3/12/2020 10:05	31.06	49.11	19.48	6.33	10.01	5.52	2.56	15.81 <56>	3.82 <56>	11.19	9.58	5253	4.05	0.98
3/12/2020 10:06	44.27	68.14	28.58	8.13	12.51	7.3	2.72	15.39 <56>	3.93 <56>	11.44	9.27	5408	4.19	1.07
3/12/2020 10:07	40.44	62.73	25.79	7.79	12.08	6.91	2.69	15.51 <56>	3.88 <56>	11.38	9.36	5342	4.17	1.04
3/12/2020 10:08	35.62	56.93	22.05	7.09	11.33	6.11	2.74	15.98 <56>	3.77 <56>	11.07	9.7	5185	4.38	1.03
3/12/2020 10:09	31.5	49.68	19.93	6.75	10.65	5.94	2.69	15.77 <56>	3.85 <56>	11.21	9.55	5300	4.24	1.04
3/12/2020 10:10	40.16	61.23	25.64	7.59	11.57	6.74	2.86	15.25 <56>	3.89 <56>	11.59	9.16	5347	4.36	1.11
3/12/2020 10:11	57.57	83.71	38.92	11.39	16.56	10.71	2.89	14.54 <56>	4.11 <56>	12.02	8.59	5662	4.20	1.19
3/12/2020 10:12	45.71	73.05	28.29	10.01	16.00	8.62	2.79	15.98 <56>	3.77 <56>	11.03	9.7	5184	4.46	1.05
3/12/2020 10:13	31.53	50.48	19.54	8.09	12.95	6.98	2.79	16.01 <56>	3.77 <56>	11.07	9.72	5191	4.47	1.05
3/12/2020 10:14	39.19	59.86	24.98	7.75	11.84	6.87	2.81	15.27 <56>	3.88 <56>	11.55	9.18	5340	4.29	1.09
3/12/2020 10:15	52.6	79.79	34.16	9.64	14.62	8.71	2.88	15.17 <56>	3.95 <56>	11.57	9.1	5439	4.37	1.14
3/12/2020 10:16	49.35	73.25	31.81	9.51	14.12	8.53	2.84	14.84 <56>	3.92 <56>	11.91	8.84	5399	4.22	1.11
3/12/2020 10:17	58.18	85.78	38.41	11.61	17.12	10.66	2.95	14.74 <56>	4.02 <56>	11.88	8.76	5530	4.35	1.19
3/12/2020 10:18	41.96	63.76	26.66	8.98	13.65	7.94	2.69	15.20 <56>	3.87 <56>	11.58	9.12	5321	4.09	1.04
3/12/2020 10:19	37.23	60.64	22.65	8.97	14.61	7.59	2.64	16.29 <56>	3.70 <56>	10.82	9.91	5095	4.30	0.98
3/12/2020 10:20	26.26	44.68	15.64	7.08	12.05	5.87	2.71	17.02 <56>	3.63 <56>	10.39	10.38	4990	4.61	0.98
3/12/2020 10:21	25.12	42.1	15.33	6.43	10.78	5.46	2.62	16.76 <56>	3.71 <56>	10.57	10.22	5112	4.39	0.97
3/12/2020 10:22	28.87	44.13	18.68	6.62	10.12	5.96	2.63	15.29 <56>	3.94 <56>	11.57	9.19	5419	4.02	1.04
3/12/2020 10:23	53.9	75.97	38.13	10.6	14.94	10.43	2.89	14.09 <56>	4.31 <56>	12.45	8.2	5926	4.07	1.24
3/12/2020 10:24	53.33	80.56	34.08	10.41	15.72	9.25	2.68	15.11 <56>	3.89 <56>	11.63	9.05	5352	4.05	1.04
3/12/2020 10:25	49.07	77.94	30.19	7.26	11.53	6.21	2.65	15.88 <56>	3.74 <56>	11.02	9.63	5153	4.21	0.99
3/12/2020 10:26	44.12	70.14	27.7	6.47	10.29	5.65	2.68	15.90 <56>	3.82 <56>	11.11	9.64	5259	4.26	1.02
3/12/2020 10:27	36.48	57.79	22.6	6.08	9.63	5.24	2.6	15.84 <56>	3.77 <56>	11.17	9.6	5188	4.12	0.98
Average	**41.28**	**63.67**	**26.39**	**8.21**	**12.68**	**7.29**	**2.68**			**11.37**	**9.35**	**5327.07**	**4.16**	**1.04**

Flow	kdscfh	5327.07
O2	% dry	9.35
CO2	% dry	11.37
NOx	ppm dry	41.28
NOx	ppm @ 3% O2	63.67
NOx	lb/hr	26.39
SO2	ppm dry	8.21
SO2	ppm @ 3% O2	12.68
SO2	lb/hr	7.29
CO	ppm dry	2.68
CO	ppm @ 3% O2	4.16
CO	lb/hr	1.04

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 10:42	33.35	54.62	19.96	7.8	12.77	6.49	2.29	16.38 <56>	3.64 <56>	10.76	9.97	5013	3.75	0.83
3/12/2020 10:43	45.69	68.55	29.52	9.6	14.40	8.63	2.31	15.00 <56>	3.93 <56>	11.71	8.97	5412	3.47	0.91
3/12/2020 10:44	46.89	72.86	29.45	10.44	16.22	9.12	2.24	15.54 <56>	3.82 <56>	11.29	9.38	5260	3.48	0.86
3/12/2020 10:45	42.41	66.53	26.23	9.06	14.21	7.8	2.28	15.69 <56>	3.76 <56>	11.22	9.49	5180	3.58	0.86
3/12/2020 10:46	48.95	75.15	31	10.17	15.61	8.96	2.4	15.35 <56>	3.85 <56>	11.42	9.24	5304	3.68	0.93
3/12/2020 10:47	47.33	73.86	29.41	9.59	14.97	8.29	2.39	15.61 <56>	3.78 <56>	11.27	9.43	5205	3.73	0.90
3/12/2020 10:48	54.03	81.07	35.32	9.91	14.87	9.01	2.37	15.00 <56>	3.98 <56>	11.65	8.97	5476	3.56	0.94
3/12/2020 10:49	41.85	66.47	25.57	9.3	14.77	7.9	2.21	15.88 <56>	3.72 <56>	11.08	9.63	5117	3.51	0.82
3/12/2020 10:50	48.37	72.15	31.53	10.72	15.99	9.72	2.3	14.92 <56>	3.97 <56>	11.73	8.9	5460	3.43	0.91
3/12/2020 10:51	49.39	75.37	30.74	11.69	17.84	10.12	2.15	15.26 <56>	3.79 <56>	11.52	9.17	5214	3.28	0.81
3/12/2020 10:52	61.3	90.31	40.21	15.02	22.13	13.71	2.22	14.73 <56>	3.99 <56>	11.81	8.75	5494	3.27	0.89
3/12/2020 10:53	60.68	86.62	39.9	15.77	22.51	14.43	2.26	14.27 <56>	4.00 <56>	12.31	8.36	5507	3.23	0.90
3/12/2020 10:54	72.08	100.88	48.49	19.69	27.56	18.43	2.34	14.00 <56>	4.09 <56>	12.47	8.11	5635	3.27	0.96
3/12/2020 10:55	49.67	78.27	30.15	15.34	24.17	12.96	2.18	15.76 <56>	3.70 <56>	11.06	9.54	5085	3.44	0.81
3/12/2020 10:56	30.98	50.6	18.28	9.97	16.28	8.19	2.05	16.33 <56>	3.59 <56>	10.75	9.94	4943	3.35	0.74
3/12/2020 10:57	38.92	57.53	25.4	10.46	15.46	9.5	2.26	14.78 <56>	3.97 <56>	11.85	8.79	5467	3.34	0.90
3/12/2020 10:58	30.61	47.69	18.83	9.97	15.53	8.53	2.28	15.58 <56>	3.74 <56>	11.25	9.41	5153	3.55	0.85
3/12/2020 10:59	39.77	58.4	25.91	10.67	15.67	9.67	2.14	14.68 <56>	3.96 <56>	11.89	8.71	5456	3.14	0.85
3/12/2020 11:00	41	63.1	25.63	11.11	17.10	9.66	2.19	15.39 <56>	3.81 <56>	11.32	9.27	5237	3.37	0.83
3/12/2020 11:01	26.95	42.8	16.47	8.56	13.60	7.28	2.12	15.88 <56>	3.72 <56>	11.03	9.63	5118	3.37	0.79
3/12/2020 11:02	26.87	42.64	16.55	7.63	12.11	6.54	2.06	15.87 <56>	3.75 <56>	11.02	9.62	5159	3.27	0.77
3/12/2020 11:03	26.06	40.7	16.48	7.54	11.78	6.63	2.02	15.62 <56>	3.85 <56>	11.24	9.44	5297	3.16	0.78
3/12/2020 11:04	27.47	42.06	17.52	7.12	10.9	6.32	2.29	15.31 <56>	3.88 <56>	11.44	9.21	5342	3.51	
3/12/2020 11:05	35.34	51.26	23.86	8.62	12.5	8.1	2.21	14.51 <56>	4.11 <56>	12.02	8.56	5655	3.21	
3/12/2020 11:06	38.97	59.77	24.81	9.24	14.17	8.18	2.18	15.34 <56>	3.87 <56>	11.38	9.23	5332	3.34	0.84
3/12/2020 11:07	37.19	57.99	23.51	8.85	13.8	7.78	2.26	15.59 <56>	3.85 <56>	11.18	9.42	5294	3.52	0.87
3/12/2020 11:08	29.93	47.33	18.52	7.57	11.97	6.52	2.16	15.81 <56>	3.77 <56>	11.08	9.58	5184	3.42	0.81
3/12/2020 11:09	30.67	49.33	18.91	7.07	11.37	6.06	2.11	16.08 <56>	3.75 <56>	10.84	9.77	5164	3.39	0.79
3/12/2020 11:10	24.27	40.72	15.02	5.43	9.11	4.68	1.8	16.78 <56>	3.77 <56>	10.41	10.23	5184	3.02	
3/12/2020 11:11	23.72	39.76	14.2	4.72	7.92	3.93	1.84	16.76 <56>	3.64 <56>	10.52	10.22	5015	3.08	
Average	**40.36**	**61.81**	**25.58**	**9.95**	**15.24**	**8.77**	**2.20**			**11.35**	**9.30**	**5278.73**	**3.39**	**0.85**

Flow	kdscfh	5278.73
O2	% dry	9.30
CO2	% dry	11.35
NOx	ppm dry	40.36
NOx	ppm @ 3% O2	61.81
NOx	lb/hr	25.58
SO2	ppm dry	9.95
SO2	ppm @ 3% O2	15.24
SO2	lb/hr	8.77
CO	ppm dry	2.20
CO	ppm @ 3% O2	3.39
CO	lb/hr	0.85

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 11:26	43.71	70.23	27.04	9.13	14.67	7.86	1.8	16.07 <56>	3.77 <56>	10.84	9.76	5182	2.89	0.68
3/12/2020 11:27	36.42	56.84	22.71	7.03	10.97	6.1	1.75	15.61 <56>	3.80 <56>	11.28	9.43	5223	2.73	0.66
3/12/2020 11:28	53.86	77.31	36.36	10.35	14.86	9.72	1.98	14.35 <56>	4.11 <56>	12.13	8.43	5655	2.84	0.81
3/12/2020 11:29	49.21	76.2	31.01	10.09	15.62	8.85	1.92	15.48 <56>	3.84 <56>	11.25	9.34	5279	2.97	0.74
3/12/2020 11:30	31.02	49.05	19.08	7.15	11.31	6.12	1.75	15.81 <56>	3.74 <56>	11.07	9.58	5151	2.77	0.66
3/12/2020 11:31	33.46	55.51	20.45	6.51	10.8	5.54	1.58	16.59 <56>	3.72 <56>	10.52	10.11	5120	2.62	0.59
3/12/2020 11:32	34.22	55.99	20.88	5.53	9.05	4.69	1.7	16.36 <56>	3.71 <56>	10.74	9.96	5111	2.78	0.63
3/12/2020 11:33	45.14	69.54	29.47	7.59	11.69	6.89	1.75	15.40 <56>	3.97 <56>	11.29	9.28	5469	2.70	0.70
3/12/2020 11:34	42.49	64.18	27.5	7.92	11.96	7.13	1.66	15.11 <56>	3.94 <56>	11.6	9.05	5422	2.51	0.65
3/12/2020 11:35	47.99	73.11	31.59	8.79	13.39	8.05	1.8	15.23 <56>	4.01 <56>	11.39	9.15	5514	2.74	0.72
3/12/2020 11:36	32.59	52.04	19.71	6.61	10.55	5.56	1.69	15.97 <56>	3.68 <56>	11.02	9.69	5066	2.70	0.62
3/12/2020 11:37	49.36	72.3	32.89	8.91	13.05	8.26	1.89	14.65 <56>	4.06 <56>	11.9	8.68	5582	2.77	0.77
3/12/2020 11:38	45.39	68.8	29.15	8.21	12.44	7.34	1.69	15.16 <56>	3.91 <56>	11.51	9.09	5380	2.56	0.66
3/12/2020 11:39	40.06	62.85	24.98	7.14	11.2	6.19	1.64	15.69 <56>	3.79 <56>	11.16	9.49	5222	2.57	0.62
3/12/2020 11:40	38.21	59.53	24.19	6.53	10.17	5.75	1.77	15.58 <56>	3.85 <56>	11.19	9.41	5303	2.76	0.68
3/12/2020 11:41	30.61	47.19	19.47	5.69	8.77	5.03	1.76	15.42 <56>	3.87 <56>	11.09	9.29	5327	2.71	0.68
3/12/2020 11:42	28.61	46.26	17.4	5.46	8.83	4.62	1.61	16.17 <56>	3.70 <56>	10.55	9.83	5093	2.60	0.60
3/12/2020 11:43	25.37	40.44	15.74	4.62	7.92	3.99	1.58	15.94 <56>	3.78 <56>	10.68	9.67	5198	2.52	0.60
3/12/2020 11:44	26.28	40.41	16.57	4.45	7.92	3.9	1.67	15.38 <56>	3.84 <56>	10.92	9.26	5281	2.57	0.64
3/12/2020 11:45	37.17	53.96	24.84	5.67	8.23	5.27	1.56	14.52 <56>	4.07 <56>	11.43	8.57	5597	2.26	0.63
3/12/2020 11:46	42.35	61.09	27.33	6.99	10.08	6.28	1.51	14.42 <56>	3.93 <56>	11.54	8.49	5405	2.18	0.59
3/12/2020 11:47	49.07	71.35	32.22	9.39	13.65	8.58	1.57	14.54 <56>	4.00 <56>	11.33	8.59	5500	2.28	0.63
3/12/2020 11:48	37.35	60.56	22.09	6.96	11.28	5.73	1.35	16.21 <56>	3.60 <56>	10.15	9.86	4953	2.19	0.49
3/12/2020 11:49	34.58	56.12	20.77	5.53	8.97	4.62	1.22	16.23 <56>	3.66 <56>	10.19	9.87	5030	1.96	0.45
3/12/2020 11:50	30.29	49.65	18.2	4.59	7.92	3.84	1.24	16.39 <56>	3.66 <56>	10.07	9.98	5034	2.03	0.45
3/12/2020 11:51	36.01	55.14	22.73	4.64	7.92	4.08	1.33	15.31 <56>	3.84 <56>	10.79	9.21	5288	2.04	0.51
3/12/2020 11:52	45.81	69.79	29.24	6.4	9.75	5.68	1.31	15.23 <56>	3.89 <56>	10.86	9.15	5347	2.00	0.51
3/12/2020 11:53	37.97	58.79	23.9	5.57	8.62	4.88	1.27	15.48 <56>	3.83 <56>	10.66	9.34	5272	1.97	0.49
3/12/2020 11:54	36.48	59.8	22.02	4.95	7.92	4.16	1.35	16.39 <56>	3.67 <56>	10.04	9.98	5057	2.21	0.50
3/12/2020 11:55	32.54	52.81	19.92	3.94	7.92	3.36	1.22	16.23 <56>	3.73 <56>	10.18	9.87	5127	1.98	0.45
Average	**38.45**	**59.56**	**24.32**	**6.74**	**10.58**	**5.94**	**1.60**			**10.98**	**9.38**	**5272.93**	**2.48**	**0.61**

Flow	kdscfh	5272.93
O2	% dry	9.38
CO2	% dry	10.98
NOx	ppm dry	38.45
NOx	ppm @ 3% O2	59.56
NOx	lb/hr	24.32
SO2	ppm dry	6.74
SO2	ppm @ 3% O2	10.58
SO2	lb/hr	5.94
CO	ppm dry	1.60
CO	ppm @ 3% O2	2.48
CO	lb/hr	0.61

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 12:11	38.93	60.18	24.51	5.8	8.97	5.08	1.22	15.46 <56>	3.83 <56>	10.69	9.32	5274	1.89	0.47
3/12/2020 12:12	43.8	67.07	27.73	6.75	10.34	5.94	1.32	15.31 <56>	3.85 <56>	10.84	9.21	5302	2.02	0.51
3/12/2020 12:13	47.76	74.66	29.83	8.04	12.57	6.99	1.25	15.63 <56>	3.80 <56>	10.51	9.45	5232	1.95	0.48
3/12/2020 12:14	43.09	66.04	27.03	7.17	10.99	6.26	1.23	15.33 <56>	3.82 <56>	10.8	9.22	5255	1.89	0.47
3/12/2020 12:15	43.78	66.87	28.18	8.1	12.37	7.25	1.21	15.27 <56>	3.92 <56>	10.77	9.18	5392	1.85	0.47
3/12/2020 12:16	34.44	57.24	20.45	6.36	10.57	5.25	1.14	16.62 <56>	3.61 <56>	9.93	10.13	4973	1.89	0.41
3/12/2020 12:17	40.38	62.15	26.02	6.77	10.42	6.07	1.28	15.39 <56>	3.92 <56>	10.72	9.27	5398	1.97	0.50
3/12/2020 12:18	40.43	63.37	25.22	7.31	11.46	6.34	1.29	15.67 <56>	3.80 <56>	10.58	9.48	5224	2.02	0.49
3/12/2020 12:19	47.03	71.95	29.94	9.21	14.09	8.16	1.38	15.30 <56>	3.87 <56>	10.79	9.2	5332	2.11	0.53
3/12/2020 12:20	44.76	68.71	28.69	8.88	13.63	7.92	1.34	15.35 <56>	3.90 <56>	10.75	9.24	5368	2.08	0.52
3/12/2020 12:21	42.42	68.65	25.53	8.1	13.11	6.78	1.24	16.18 <56>	3.66 <56>	10.13	9.84	5041	2.01	0.45
3/12/2020 12:22	38.66	62.23	23.78	7.43	11.96	6.36	1.1	16.10 <56>	3.74 <56>	10.25	9.78	5152	1.77	0.41
3/12/2020 12:23	33.05	53.98	20.01	6.56	10.71	5.53	1.17	16.33 <56>	3.69 <56>	10.09	9.94	5071	1.91	0.43
3/12/2020 12:24	35.17	58.29	21.56	6.47	10.72	5.52	1.06	16.57 <56>	3.73 <56>	9.92	10.1	5135	1.76	0.40
3/12/2020 12:25	34.68	55.03	21.53	6.05	9.6	5.23	1.13	15.87 <56>	3.78 <56>	10.46	9.62	5201	1.79	0.43
3/12/2020 12:26	44.77	68.32	29.24	9.13	13.93	8.3	1.12	15.26 <56>	3.98 <56>	10.78	9.17	5471	1.71	0.45
3/12/2020 12:27	37.95	60.17	23.64	7.45	11.81	6.46	1.03	15.85 <56>	3.79 <56>	10.42	9.61	5217	1.63	0.39
3/12/2020 12:28	41.49	63.21	26.49	7.77	11.84	6.9	1.08	15.23 <56>	3.89 <56>	10.86	9.15	5347	1.65	0.42
3/12/2020 12:29	40.91	66.03	25.38	7.73	12.48	6.67	1.08	16.14 <56>	3.78 <56>	10.13	9.81	5197	1.74	0.41
3/12/2020 12:30	34.41	59.68	20.24	5.52	9.57	4.52	0.8	17.34 <56>	3.58 <56>	9.53	10.58	4928	1.39	0.29
3/12/2020 12:31	31.7	54.72	18.85	4.77	8.23	3.95	0.76	17.26 <56>	3.62 <56>	9.53	10.53	4982	1.31	0.28
3/12/2020 12:32	36.86	60.31	23.46	4.78	7.82	4.23	0.84	16.36 <56>	3.87 <56>	10.09	9.96	5331	1.37	0.33
3/12/2020 12:33	39.9	63.43	25.39	5.37	8.54	4.75	0.93	15.90 <56>	3.87 <56>	10.43	9.64	5330	1.48	0.36
3/12/2020 12:34	46.93	73.05	30.21	7.21	11.22	6.46	0.99	15.57 <56>	3.92 <56>	10.64	9.4	5392	1.54	0.39
3/12/2020 12:35	49.36	74.31	32.54	8.55	12.87	7.84	1.14	15.05 <56>	4.01 <56>	10.97	9.01	5522	1.72	0.46
3/12/2020 12:36	49.68	75.88	32.16	9.19	14.04	8.28	1.06	15.27 <56>	3.94 <56>	10.86	9.18	5423	1.62	0.42
3/12/2020 12:37	49.24	74.76	31.23	9.48	14.39	8.37	1.11	15.18 <56>	3.86 <56>	10.93	9.11	5313	1.69	0.43
3/12/2020 12:38	54.46	77.61	36.45	12.84	18.3	11.96	1.15	14.25 <56>	4.07 <56>	11.62	8.34	5606	1.64	0.47
3/12/2020 12:39	50.16	74.33	32.13	13.24	19.62	11.8	1.11	14.82 <56>	3.90 <56>	10.97	8.82	5366	1.64	0.43
3/12/2020 12:40	40.97	64.73	24.32	9.09	14.36	7.51	1.07	15.80 <56>	3.61 <56>	10.29	9.57	4973	1.69	0.39
Average	**41.91**	**65.57**	**26.39**	**7.70**	**12.02**	**6.76**	**1.12**			**10.51**	**9.50**	**5258.27**	**1.76**	**0.43**

Flow	kdscfh	5258.27
O2	% dry	9.50
CO2	% dry	10.51
NOx	ppm dry	41.91
NOx	ppm @ 3% O2	65.57
NOx	lb/hr	26.39
SO2	ppm dry	7.70
SO2	ppm @ 3% O2	12.02
SO2	lb/hr	6.76
CO	ppm dry	1.12
CO	ppm @ 3% O2	1.76
CO	lb/hr	0.43

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/12/2020 12:58	43.67	72.18	23.41	1.32	2.18	0.98	0.68	16.53 <56>	3.26 <56>	9.01	10.07	4491	1.12	
3/12/2020 12:59	43.37	78.58	22.01	1.08	1.96	0.76	0.46	18.12 <56>	3.09 <56>	7.86	11.02	4251	0.83	
3/12/2020 13:00	40.18	78.43	19.31	0.98	1.91	0.66	0.38	19.52 <56>	2.93 <56>	7.03	11.73	4026	0.74	0.11
3/12/2020 13:01	37.11	71.12	18.25	0.75	1.44	0.51	0.31	19.16 <56>	2.99 <56>	7.15	11.56	4119	0.59	0.09
3/12/2020 13:02	34.11	66.88	16.79	0.67	1.31	0.46	0.26	19.61 <56>	3.00 <56>	6.84	11.77	4122	0.51	0.08
3/12/2020 13:03	34.07	65.58	16.72	0.58	1.12	0.4	0.22	19.25 <56>	2.99 <56>	7.02	11.6	4110	0.42	0.07
3/12/2020 13:04	35.48	65.41	18.41	0.62	1.14	0.45	0.26	18.43 <56>	3.16 <56>	7.32	11.19	4347	0.48	0.08
3/12/2020 13:05	37.69	71.62	19.02	0.48	0.91	0.34	0.2	19.00 <56>	3.07 <56>	7.12	11.48	4228	0.38	0.06
3/12/2020 13:06	58.17	126.98	27.72	0.4	0.87	0.27	0.24	21.83 <56>	2.90 <56>	5.91	12.7	3991	0.52	0.07
3/12/2020 13:07	60.54	114.07	31	0.49	0.92	0.35	0.1	18.84 <56>	3.12 <56>	7.19	11.4	4289	0.19	0.03
3/12/2020 13:08	66.39	135.35	33.02	0.44	0.90	0.3	0.09	20.39 <56>	3.03 <56>	6.43	12.12	4166	0.18	0.03
3/12/2020 13:09	62.39	128.81	31.68	0.41	0.85	0.29	0.14	20.65 <56>	3.09 <56>	6.32	12.23	4253	0.29	0.04
3/12/2020 13:10	63.43	144.27	31.36	0.35	0.80	0.24	0.05	22.74 <56>	3.01 <56>	5.55	13.03	4141	0.11	0.02
3/12/2020 13:11	62.76	139.38	32.11	0.4	0.89	0.28	0.02	22.21 <56>	3.11 <56>	5.63	12.84	4286	0.04	0.01
3/12/2020 13:12	28.62	64.28	14.58	0.4	0.90	0.28	0.08	22.46 <56>	3.10 <56>	5.6	12.93	4267	0.18	0.02
3/12/2020 13:13	18.77	43.19	9.48	0.36	0.83	0.25	0.06	23.01 <56>	3.08 <56>	5.36	13.12	4232	0.14	0.02
3/12/2020 13:14	23.28	60.04	11.63	0.28	0.72	0.19	0	25.79 <56>	3.04 <56>	4.5	13.96	4185	0.00	0.00
3/12/2020 13:15	36.01	93.55	17.95	0.25	0.65	0.17	0	25.98 <56>	3.03 <56>	4.51	14.01	4176	0.00	0.00
3/12/2020 13:16	40.85	115.33	19.82	0.27	0.76	0.18	0	28.23 <56>	2.95 <56>	3.89	14.56	4065	0.00	0.00
3/12/2020 13:17	27.95	82.29	12.9	0.23	0.68	0.15	0	29.44 <56>	2.81 <56>	3.62	14.82	3867	0.00	0.00
3/12/2020 13:18	26.42	75.55	12.16	0.22	0.63	0.14	0	28.59 <56>	2.80 <56>	3.71	14.64	3855	0.00	0.00
3/12/2020 13:19	27.54	73.91	12.22	0.17	0.46	0.1	0	26.84 <56>	2.70 <56>	3.92	14.23	3717	0.00	0.00
3/12/2020 13:20	27.16	70.36	11.99	0.21	0.54	0.13	0	25.90 <56>	2.69 <56>	4.06	13.99	3697	0.00	0.00
3/12/2020 13:21	29.46	71.75	13.1	0.18	0.44	0.11	0	24.35 <56>	2.71 <56>	4.3	13.55	3725	0.00	0.00
3/12/2020 13:22	30.04	72.27	13.17	0.17	0.41	0.1	0	24.06 <56>	2.67 <56>	4.35	13.46	3671	0.00	0.00
3/12/2020 13:23	29.97	69.94	13.34	0.15	0.35	0.09	0	23.34 <56>	2.71 <56>	4.47	13.23	3727	0.00	0.00
3/12/2020 13:24	30.54	70.72	13.42	0.23	0.53	0.14	0	23.16 <56>	2.67 <56>	4.5	13.17	3680	0.00	0.00
3/12/2020 13:25	29.78	69.41	12.16	0.28	0.65	0.16	0	23.31 <56>	2.49 <56>	4.47	13.22	3421	0.00	0.00
3/12/2020 13:26	30.85	70.53	11.96	0.13	0.30	0.07	0	22.86 <56>	2.36 <56>	4.56	13.07	3246	0.00	0.00
3/12/2020 13:27	32.6	68.98	12.78	0.27	0.57	0.15	0	21.16 <56>	2.39 <56>	4.92	12.44	3284	0.00	0.00
Average	**38.31**	**84.36**	**18.45**	**0.43**	**0.89**	**0.29**	**0.12**			**5.57**	**12.77**	**3987.83**	**0.22**	**0.03**

Flow	kdscfh	3987.83
O2	% dry	12.77
CO2	% dry	5.57
NOx	ppm dry	38.31
NOx	ppm @ 3% O2	84.36
NOx	lb/hr	18.45
SO2	ppm dry	0.43
SO2	ppm @ 3% O2	0.89
SO2	lb/hr	0.29
CO	ppm dry	0.12
CO	ppm @ 3% O2	0.22
CO	lb/hr	0.03

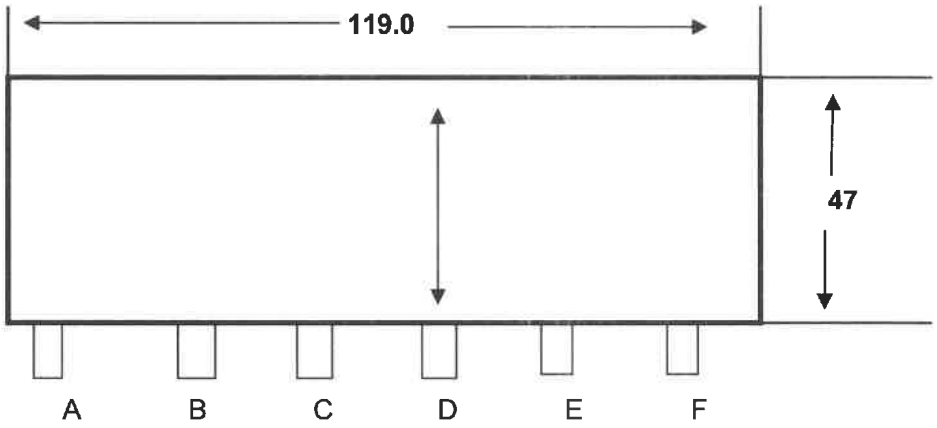
Appendix A.2
Unit 2 Data

Appendix A.2.1
Unit 2 Sample Location

Method 1

Client: Desert View Power Date: 3/12/2020

Sample Location: Unit 1-2 Prepared By: Dave Wonderly



H (in.)	**119.0**
W (in.)	**47.0**
Nipple length	**13.0**
Distance between points	**9.40**
Stack Area (ft^2)	**38.84**

Point No.	Sample Point Inches from nozzle	
1	4.7	17.7
2	14.1	27.1
3	23.5	36.5
4	32.9	45.9
5	42.3	55.3

Appendix A.2.2
Unit 2 CEMS Data

Date	Time	O2 %	CO2 %	NOx ppm	CO ppm	
3/10/2020	6:27	-0.005	0.047	0.013	0.006	
3/10/2020	6:28	13.3	14.609	78.47	1.824	
3/10/2020	6:29	19.157	18.938	90.943	9.224	
3/10/2020	6:30	19.155	18.938	90.528	9.734	
3/10/2020	6:31	19.158	18.934	90.546	9.75	High
3/10/2020	6:32	13.104	12.21	55.286	8.195	
3/10/2020	6:33	10.522	10.597	47.702	4.853	
3/10/2020	6:34	10.52	10.594	47.641	4.794	Mid
3/10/2020	6:35	4.677	4.563	14.017	3.608	
3/10/2020	6:36	0	0.053	0.042	0.13	
3/10/2020	6:37	-0.002	0.049	0.04	0.007	Zero
3/10/2020	6:38	8.719	0.068	0.022	0.027	NO Mode Zero
3/10/2020	6:39	20.937	0.101	80.782	0.398	
3/10/2020	6:40	20.841	0.226	90.684	0.499	NO Mode High
3/10/2020	6:41	10.497	10.564	14.549	0.25	
3/10/2020	6:42	9.233	11.273	0.099	0.071	NO2 Gas NO Mode
3/10/2020	6:43	9.518	11.092	26.807	0.075	
3/10/2020	6:44	9.334	11.204	43.771	0.075	NO2 Gas NOx Mode
3/10/2020	6:45	8.949	11.594	42.666	0.07	
3/10/2020	6:46	9.861	10.687	28.948	0.072	
3/10/2020	6:47	9.716	7.049	13.776	0.119	
3/10/2020	6:48	0.046	0.085	0.401	3.045	
3/10/2020	6:49	0.029	0.066	0.362	4.757	CO Bias
3/10/2020	6:50	0.078	0.125	17.74	4.595	
3/10/2020	6:51	0.028	0.056	47.476	1.11	NOx Bias
3/10/2020	6:52	6.673	7.723	13.598	0.271	
3/10/2020	6:53	10.518	10.502	0.277	0.017	O2 CO2 Bias
3/10/2020	6:54	10.335	10.646	10.928	0.025	
3/10/2020	6:55	9.743	10.973	29.126	0.071	
3/10/2020	6:56	8.766	11.981	43.743	0.07	
3/10/2020	6:57	8.845	11.693	41.963	0.066	
3/10/2020	6:58	9.057	11.634	41.605	0.068	
3/10/2020	6:59	9.252	11.351	36.685	0.067	
3/10/2020	7:00	9.293	11.243	34.877	0.065	
3/10/2020	7:01	9.505	11.252	36.721	0.062	
3/10/2020	7:02	9.763	10.811	26.66	0.068	
3/10/2020	7:03	9.206	11.395	38.781	0.073	
3/10/2020	7:04	9.719	10.872	32.92	0.074	
3/10/2020	7:05	9.977	10.696	26.753	0.074	
3/10/2020	7:06	9.883	10.752	25.582	0.079	
3/10/2020	7:07	9.561	11.016	29.065	0.077	
3/10/2020	7:08	9.58	11.143	30.129	0.074	
3/10/2020	7:09	9.36	11.097	31.08	0.077	
3/10/2020	7:10	9.406	11.151	36.351	0.074	
3/10/2020	7:11	9.476	11.313	35.766	0.08	
3/10/2020	7:12	9.096	11.346	46.001	0.078	
3/10/2020	7:13	10.414	10.048	26.209	0.085	

3/10/2020	7:14	10.318	10.221	32.476	0.098	
3/10/2020	7:15	10.266	10.406	31.558	0.101	
3/10/2020	7:16	9.375	11.368	40.991	0.092	
3/10/2020	7:17	9.606	11.031	31.43	0.086	
3/10/2020	7:18	9.337	11.241	34.148	0.082	
3/10/2020	7:19	9.329	11.202	37.325	0.085	
3/10/2020	7:20	9.136	11.528	41.012	0.082	
3/10/2020	7:21	8.288	12.248	54.494	0.084	
3/10/2020	7:22	8.937	11.529	47.555	0.08	
3/10/2020	7:23	9.818	10.711	35.435	0.081	
3/10/2020	7:24	9.492	11.132	44.465	0.087	
3/10/2020	7:25	9.565	11.03	39.772	0.08	
3/10/2020	7:26	10.024	10.431	29.86	0.085	
3/10/2020	7:27	9.703	11.03	39.031	0.096	
3/10/2020	7:28	9.87	10.665	29.858	0.09	
3/10/2020	7:29	9.705	10.865	33.586	0.089	
3/10/2020	7:30	9.668	10.961	36.958	0.086	
Run 1 Average		9.58	11.02	35.40	0.08	
3/10/2020	7:31	10.215	10.397	17.888	0.088	
3/10/2020	7:32	10.532	10.541	0.141	0.045	
3/10/2020	7:33	5.918	4.858	0.115	0.356	
3/10/2020	7:34	0.032	0.102	0.104	4.093	
3/10/2020	7:35	0.026	0.082	0.101	4.764	CO Bias
3/10/2020	7:36	0.025	0.071	31.383	4.659	
3/10/2020	7:37	0.022	0.068	47.463	4.74	NOx Bias
3/10/2020	7:38	0.025	0.052	6.652	4.784	CO Span
3/10/2020	7:39	0.004	0.05	0.063	4.267	O2 CO2 NOx Zero
3/10/2020	7:40	8.176	9.201	43.504	0.404	
3/10/2020	7:41	10.537	10.575	47.737	0.011	O2 CO2 NOx Span, CO Zero
3/10/2020	7:42	9.884	10.811	39.098	0.032	
3/10/2020	7:43	9.498	11.027	41.887	0.077	
3/10/2020	7:44	9.58	10.938	35.813	0.079	
3/10/2020	7:45	9.189	11.325	41.183	0.08	
3/10/2020	7:46	10.411	10.156	22.151	0.091	
3/10/2020	7:47	10.173	10.422	26.686	0.092	
3/10/2020	7:48	9.199	11.339	41.139	0.09	
3/10/2020	7:49	9.982	10.456	29.106	0.078	
3/10/2020	7:50	10.011	10.605	36.579	0.086	
3/10/2020	7:51	9.606	10.955	35.942	0.08	
3/10/2020	7:52	9.479	11.085	40.814	0.086	
3/10/2020	7:53	9.843	10.677	33.714	0.077	
3/10/2020	7:54	10.032	10.469	31.253	0.088	
3/10/2020	7:55	9.82	10.797	35.573	0.086	
3/10/2020	7:56	9.574	10.875	35.567	0.083	
3/10/2020	7:57	9.823	10.716	39.541	0.082	
3/10/2020	7:58	9.724	10.853	36.256	0.079	
3/10/2020	7:59	9.683	10.807	40.885	0.082	
3/10/2020	8:00	9.999	10.574	36.349	0.087	
3/10/2020	8:01	9.526	10.981	42.753	0.09	

3/10/2020	8:02	9.498	11.015	41.954	0.088	
3/10/2020	8:03	9.514	11.012	44.209	0.091	
3/10/2020	8:04	9.698	10.764	36.942	0.091	
3/10/2020	8:05	9.658	10.927	37.774	0.089	
3/10/2020	8:06	9.263	11.238	43.953	0.095	
3/10/2020	8:07	9.412	11.083	37.6	0.096	
3/10/2020	8:08	9.379	11.192	39.12	0.108	
3/10/2020	8:09	9.527	10.907	36.83	0.102	
3/10/2020	8:10	10.357	10.118	25.852	0.103	
3/10/2020	8:11	10.846	9.774	21.617	0.117	
3/10/2020	8:12	9.627	10.893	37.336	0.118	
3/10/2020	8:13	10.129	10.439	32.085	0.118	
Run 2 Average		9.75	10.78	35.89	0.09	
3/10/2020	8:14	9.701	9.897	10.128	0.103	
3/10/2020	8:15	10.513	10.499	0.11	0.046	O2 CO2 Bias
3/10/2020	8:16	4.882	4.413	0.101	0.454	
3/10/2020	8:17	0.021	0.097	0.101	4.232	
3/10/2020	8:18	0.013	0.077	0.08	4.802	CO Bias
3/10/2020	8:19	0.004	0.069	26.923	4.815	
3/10/2020	8:20	0.016	0.065	47.385	4.833	NOx Bias;Co span
3/10/2020	8:21	0.013	0.051	12.943	3.225	
3/10/2020	8:22	0.004	0.048	0.054	0.089	O2 CO2 NOx Bias; Zero
3/10/2020	8:23	9.183	9.217	40.491	0.042	CO Zero
3/10/2020	8:24	10.556	10.504	47.691	0.103	O2 CO2 NOx Span
3/10/2020	8:25	10.011	10.611	41.315	0.108	
3/10/2020	8:26	9.587	10.896	41.078	0.106	
3/10/2020	8:27	9.244	11.253	45.568	0.109	
3/10/2020	8:28	9.848	10.599	38.917	0.104	
3/10/2020	8:29	10.265	10.222	35.801	0.108	
3/10/2020	8:30	9.96	10.607	41.354	0.115	
3/10/2020	8:31	10.02	10.44	36.006	0.114	
3/10/2020	8:32	10.032	10.509	39.173	0.119	
3/10/2020	8:33	10.001	10.429	35.549	0.112	
3/10/2020	8:34	10.329	10.189	31.908	0.12	
3/10/2020	8:35	10.174	10.394	38.802	0.125	
3/10/2020	8:36	9.401	11.102	42.219	0.114	
3/10/2020	8:37	9.259	11.24	44.882	0.116	
3/10/2020	8:38	8.862	11.601	47.969	0.108	
3/10/2020	8:39	8.863	11.599	50.28	0.104	
3/10/2020	8:40	9.447	11.043	42.543	0.104	
3/10/2020	8:41	9.163	11.347	42.921	0.102	
3/10/2020	8:42	9.169	11.283	42.642	0.103	
3/10/2020	8:43	8.913	11.647	49.612	0.104	
3/10/2020	8:44	8.786	11.608	46.552	0.099	
3/10/2020	8:45	9.763	10.692	36.103	0.099	
3/10/2020	8:46	9.594	10.962	34.446	0.108	
3/10/2020	8:47	9.793	10.693	32.096	0.099	
3/10/2020	8:48	9.923	10.535	30.538	0.102	
3/10/2020	8:49	9.77	10.795	36.895	0.113	

3/10/2020	8:50	10.199	10.261	26.674	0.111	
3/10/2020	8:51	10.649	9.864	21.075	0.118	
3/10/2020	8:52	10.51	10.027	25.08	0.13	
3/10/2020	8:53	10.298	10.283	30.983	0.127	
3/10/2020	8:54	10.18	10.356	28.955	0.123	
3/10/2020	8:55	9.935	10.613	34.439	0.117	
Run 3 Average		9.73	10.77	37.70	0.11	
3/10/2020	8:56	9.736	9.738	10.219	0.101	
3/10/2020	8:57	10.52	10.444	0.1	0.036	O2 CO2 Bias
3/10/2020	8:58	5.219	4.766	0.079	0.388	
3/10/2020	8:59	0.023	0.1	0.073	4.138	
3/10/2020	9:00	0.017	0.079	0.072	4.781	CO Bias
3/10/2020	9:01	0.014	0.071	30.212	4.79	
3/10/2020	9:02	0.014	0.065	47.391	4.803	NOx Bias, CO Span
3/10/2020	9:03	0.005	0.051	8.052	4.468	
3/10/2020	9:04	-0.002	0.047	0.049	0.6	O2 CO2 NOx Zero
3/10/2020	9:05	7.066	7.956	38.599	0.017	CO Zero
3/10/2020	9:06	10.535	10.485	47.689	0.012	O2 CO2 NOx Spsan
3/10/2020	9:07	10.172	10.492	36.983	0.055	
3/10/2020	9:08	9.503	10.97	35.892	0.102	
3/10/2020	9:09	9.271	11.135	39.683	0.101	
3/10/2020	9:10	9.744	10.702	37.02	0.108	
3/10/2020	9:11	9.676	10.791	38.607	0.104	
3/10/2020	9:12	9.983	10.501	40.082	0.11	
3/10/2020	9:13	9.707	10.786	39.095	0.105	
3/10/2020	9:14	9.768	10.744	39.996	0.11	
3/10/2020	9:15	9.347	11.18	44.047	0.114	
3/10/2020	9:16	8.896	11.532	43.758	0.113	
3/10/2020	9:17	8.615	11.798	51.666	0.107	
3/10/2020	9:18	9.538	10.949	42.984	0.118	
3/10/2020	9:19	9.359	11.153	43.153	0.108	
3/10/2020	9:20	10.06	10.342	30.569	0.106	
3/10/2020	9:21	10.189	10.346	32.82	0.109	
3/10/2020	9:22	9.98	10.537	30.662	0.111	
3/10/2020	9:23	9.806	10.724	34.823	0.112	
3/10/2020	9:24	9.694	10.814	37.303	0.107	
3/10/2020	9:25	9.524	10.944	38.96	0.109	
3/10/2020	9:26	9.647	10.83	37.845	0.104	
3/10/2020	9:27	9.825	10.734	38.682	0.103	
3/10/2020	9:28	8.739	11.766	53.658	0.103	
3/10/2020	9:29	8.614	11.756	53.137	0.098	
3/10/2020	9:30	8.558	11.96	54.383	0.098	
3/10/2020	9:31	9.345	11.097	39.892	0.105	
3/10/2020	9:32	9.847	10.556	31.604	0.109	
3/10/2020	9:33	9.471	11.086	39.98	0.114	
3/10/2020	9:34	9.321	11.175	39.655	0.108	
3/10/2020	9:35	9.457	10.978	37.356	0.112	
3/10/2020	9:36	10.083	10.424	30.428	0.114	
3/10/2020	9:37	9.446	11.102	39.356	0.109	

3/10/2020	9:38	9.52	10.961	40.153	0.107	
Run 4 Average		9.50	10.98	40.05	0.11	
3/10/2020	9:39	9.367	10.041	16.052	0.105	
3/10/2020	9:40	10.539	10.436	0.105	0.055	O2 CO2 Bias
3/10/2020	9:41	4.194	3.616	0.082	0.686	
3/10/2020	9:42	0.02	0.098	0.073	4.436	
3/10/2020	9:43	0.012	0.079	0.073	4.806	CO Bias
3/10/2020	9:44	0.016	0.073	29.294	4.819	
3/10/2020	9:45	0.016	0.067	47.309	4.837	NOx Bias, CO Span
3/10/2020	9:46	0.006	0.053	7.321	3.014	
3/10/2020	9:47	0	0.05	0.046	0.072	O2 CO2 NOx Zero
3/10/2020	9:48	8.536	8.511	37.547	0.033	CO Zero
3/10/2020	9:49	10.562	10.473	47.697	0.047	O2 CO2 NOx Span
3/10/2020	9:50	9.322	11.351	49.777	0.098	
3/10/2020	9:51	9.241	11.272	48.143	0.1	
3/10/2020	9:52	9.428	11.021	46.623	0.095	
3/10/2020	9:53	8.764	11.826	55.547	0.092	
3/10/2020	9:54	8.145	12.28	55.708	0.094	
3/10/2020	9:55	8.708	11.827	52.713	0.092	
3/10/2020	9:56	9.037	11.453	44.555	0.09	
3/10/2020	9:57	8.596	11.903	52.813	0.088	
3/10/2020	9:58	9.204	11.323	43.187	0.087	
3/10/2020	9:59	8.724	11.882	54.687	0.092	
3/10/2020	10:00	9.319	11.184	41.326	0.091	
3/10/2020	10:01	9.722	10.88	36.787	0.086	
3/10/2020	10:02	10.186	10.379	27.158	0.09	
3/10/2020	10:03	9.676	10.903	33.064	0.097	
3/10/2020	10:04	9.821	10.812	30.407	0.097	
3/10/2020	10:05	9.738	10.875	26.709	0.09	
3/10/2020	10:06	8.931	11.637	42.246	0.092	
3/10/2020	10:07	9.338	11.124	34.52	0.084	
3/10/2020	10:08	9.861	10.734	31.685	0.084	
3/10/2020	10:09	9.015	11.518	39.439	0.088	
3/10/2020	10:10	9.357	11.077	35.57	0.082	
3/10/2020	10:11	9.695	10.93	33.604	0.087	
3/10/2020	10:12	9.399	11.058	33.245	0.075	
3/10/2020	10:13	8.767	11.763	44.821	0.08	
3/10/2020	10:14	8.783	11.751	43.029	0.076	
3/10/2020	10:15	8.92	11.547	41.137	0.077	
3/10/2020	10:16	9.298	11.143	35.033	0.077	
3/10/2020	10:17	9.827	10.718	31.005	0.076	
3/10/2020	10:18	9.544	11.065	32.79	0.082	
3/10/2020	10:19	8.465	11.966	48.449	0.073	
3/10/2020	10:20	9.428	11.037	36.014	0.072	
Run 5 Average		9.23	11.30	40.40	0.09	
3/10/2020	10:21	9.696	9.731	9.578	0.073	
3/10/2020	10:22	10.514	10.44	0.116	0.032	O2 CO2 Bias
3/10/2020	10:23	9.834	9.103	0.097	0.033	
3/10/2020	10:24	0.057	0.139	0.091	2.423	

3/10/2020	10:25	0.023	0.089	0.072	4.741	CO Bias
3/10/2020	10:26	0.016	0.076	17.144	4.773	
3/10/2020	10:27	0.01	0.071	47.359	4.799	Nox Bias, CO Span
3/10/2020	10:28	0.006	0.056	13.429	3.504	
3/10/2020	10:29	-0.005	0.05	0.053	0.115	O2 CO2 NOx Zero
3/10/2020	10:30	8.352	8.348	36.811	0.012	CO Zero
3/10/2020	10:31	10.538	10.477	47.72	0.024	O2 CO2 NOx Span
3/10/2020	10:32	9.571	10.948	40.218	0.074	
3/10/2020	10:33	9.662	10.883	34.317	0.074	
3/10/2020	10:34	9.371	11.071	34.597	0.079	
3/10/2020	10:35	10.27	10.232	22.576	0.088	
3/10/2020	10:36	9.463	11.037	33.613	0.092	
3/10/2020	10:37	9.539	10.914	30.986	0.085	
3/10/2020	10:38	10.077	10.429	23.799	0.092	
3/10/2020	10:39	10.417	10.075	20.519	0.102	
3/10/2020	10:40	9.905	10.721	27.268	0.11	
3/10/2020	10:41	9.443	11.002	31.529	0.096	
3/10/2020	10:42	9.617	10.848	32.383	0.094	
3/10/2020	10:43	9.787	10.764	32.406	0.095	
3/10/2020	10:44	8.852	11.613	43.142	0.093	
3/10/2020	10:45	9.358	11.145	41.477	0.092	
3/10/2020	10:46	9.199	11.322	40.113	0.095	
3/10/2020	10:47	8.742	11.657	45.323	0.089	
3/10/2020	10:48	9.227	11.277	41.162	0.09	
3/10/2020	10:49	9.339	11.062	40.558	0.093	
3/10/2020	10:50	10.272	10.192	23.496	0.1	
3/10/2020	10:51	10.165	10.319	24.673	0.106	
3/10/2020	10:52	9.924	10.606	33.117	0.107	
3/10/2020	10:53	9.841	10.635	33.531	0.099	
3/10/2020	10:54	10.031	10.408	31.587	0.105	
3/10/2020	10:55	10.583	9.914	25.571	0.116	
3/10/2020	10:56	10.585	10.016	24.943	0.123	
3/10/2020	10:57	10.004	10.467	33.955	0.117	
3/10/2020	10:58	9.674	10.819	37.464	0.115	
3/10/2020	10:59	9.53	11.035	41.556	0.107	
3/10/2020	11:00	8.992	11.403	44.946	0.112	
3/10/2020	11:01	9.279	11.232	47.719	0.112	
3/10/2020	11:02	8.958	11.582	50.659	0.105	
3/10/2020	11:03	9.142	11.256	46.488	0.11	
3/10/2020	11:04	9.698	10.714	39.37	0.113	
3/10/2020	11:05	10.355	10.161	29.751	0.117	
3/10/2020	11:06	10.229	10.296	32.703	0.125	
3/10/2020	11:07	10.199	10.364	33.273	0.132	
Run 6 Average		9.71	10.78	35.15	0.11	
3/10/2020	11:08	9.286	10.096	15.49	0.116	
3/10/2020	11:09	10.537	10.413	0.105	0.071	O2 CO2 Bias
3/10/2020	11:10	4.577	4.062	0.089	0.583	
3/10/2020	11:11	0.028	0.101	0.073	4.384	
3/10/2020	11:12	0.025	0.082	0.073	4.837	CO Bias

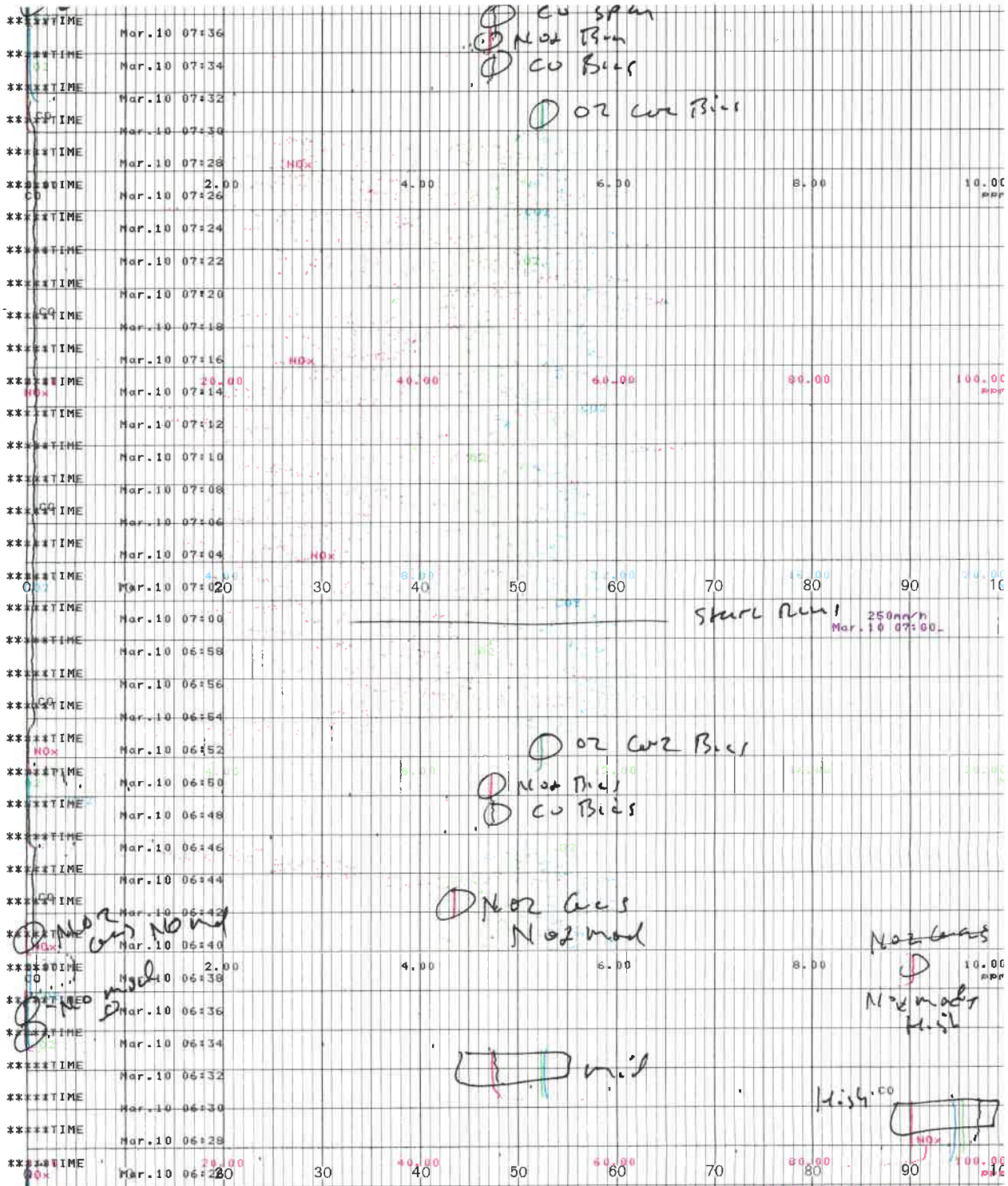
3/10/2020	11:13	0.024	0.074	17.913	4.701	
3/10/2020	11:14	0.02	0.07	47.252	1.227	NOx Bias
3/10/2020	11:15	0.011	0.057	23.515	0.28	
3/10/2020	11:16	0.001	0.049	0.047	0.055	Zero
3/10/2020	11:17	7.397	8.348	39.711	1.366	
3/10/2020	11:18	10.568	10.45	47.67	4.746	
3/10/2020	11:19	10.568	10.456	47.676	4.828	Span
3/10/2020	11:20	10.1	10.699	45.55	3.909	
3/10/2020	11:21	9.375	10.974	42.611	0.295	
3/10/2020	11:22	9.848	10.724	37.511	0.115	
3/10/2020	11:23	9.595	10.899	41.333	0.119	
3/10/2020	11:24	8.951	11.624	52.927	0.111	
3/10/2020	11:25	8.551	11.858	56.065	0.109	
3/10/2020	11:26	8.787	11.617	56.197	0.106	
3/10/2020	11:27	9.377	11.088	46.736	0.108	
3/10/2020	11:28	10.043	10.406	35.905	0.111	
3/10/2020	11:29	9.855	10.691	36.424	0.116	
3/10/2020	11:30	9.923	10.618	36.432	0.114	
3/10/2020	11:31	9.029	11.507	52.683	0.108	
3/10/2020	11:32	9.072	11.285	46.464	0.101	
3/10/2020	11:33	9.073	11.421	53.762	0.102	
3/10/2020	11:34	8.989	11.45	50.914	0.102	
3/10/2020	11:35	9.655	10.67	42.385	0.103	
3/10/2020	11:36	10.38	10.14	31.213	0.114	
3/10/2020	11:37	10.34	10.164	33.917	0.11	
3/10/2020	11:38	10.308	10.144	30.096	0.112	
3/10/2020	11:39	10.337	10.145	28.351	0.117	
3/10/2020	11:40	9.695	10.823	38.145	0.114	
3/10/2020	11:41	9.661	10.827	40.293	0.106	
3/10/2020	11:42	9.413	11.112	44.282	0.104	
3/10/2020	11:43	9.148	11.292	47.184	0.104	
3/10/2020	11:44	9.255	11.201	49.197	0.1	
3/10/2020	11:45	9.148	11.104	48.196	0.103	
3/10/2020	11:46	9.028	11.459	50.485	0.1	
3/10/2020	11:47	9.315	11.12	49.137	0.097	
3/10/2020	11:48	9.841	10.625	37.638	0.095	
3/10/2020	11:49	9.55	10.87	38.146	0.094	
3/10/2020	11:50	9.895	10.574	35.298	0.101	
3/10/2020	11:51	9.737	10.707	36.662	0.095	
Run 7 Average		9.53	10.94	42.80	0.11	
3/10/2020	11:52	10.002	10.375	29.324	0.097	
3/10/2020	11:53	9.821	9.7	8.022	0.089	
3/10/2020	11:54	10.507	10.438	0.09	0.039	O2 CO2 Bias
3/10/2020	11:55	3.692	3.197	0.072	0.726	
3/10/2020	11:56	0.02	0.096	0.072	4.413	
3/10/2020	11:57	0.016	0.08	0.072	4.747	CO Bias
3/10/2020	11:58	0.007	0.073	34.326	3.801	
3/10/2020	11:59	-0.025	0.068	47.419	0.406	NOx Bias
3/10/2020	12:00	-0.024	0.066	47.447	0.021	CO Bias

3/10/2020	12:01	-0.004	0.056	11.664	0.898	
3/10/2020	12:02	-0.001	0.051	0.042	4.505	O2 CO2 NOx Zero
3/10/2020	12:03	7.468	7.134	31.027	4.76	CO Span
3/10/2020	12:04	10.521	10.478	47.579	3.316	O2 CO2 NOx Span
3/10/2020	12:05	10.134	10.665	45.507	0.157	
3/10/2020	12:06	9.658	10.657	36.764	0.088	
3/10/2020	12:07	10.05	10.487	34.324	0.096	
3/10/2020	12:08	9.685	10.745	41.54	0.099	
3/10/2020	12:09	9.148	11.285	48.574	0.093	
3/10/2020	12:10	9.631	10.808	42.913	0.094	
3/10/2020	12:11	9.9	10.548	35.884	0.095	
3/10/2020	12:12	9.549	10.84	40.422	0.097	
3/10/2020	12:13	9.359	11.092	44.146	0.103	
3/10/2020	12:14	9.596	10.866	37.695	0.101	
3/10/2020	12:15	9.416	11.054	40.678	0.1	
3/10/2020	12:16	9.302	11.159	44.18	0.091	
3/10/2020	12:17	9.016	11.296	46.933	0.097	
3/10/2020	12:18	9.368	11.1	45.063	0.094	
3/10/2020	12:19	9.646	10.781	44.857	0.095	
3/10/2020	12:20	9.921	10.542	41.68	0.101	
3/10/2020	12:21	9.783	10.623	39.476	0.101	
3/10/2020	12:22	10.559	9.884	29.085	0.1	
3/10/2020	12:23	10.456	10.017	29.269	0.11	
3/10/2020	12:24	10.189	10.293	33.513	0.107	
3/10/2020	12:25	10.093	10.324	37.559	0.1	
3/10/2020	12:26	10.229	10.25	39.597	0.101	
3/10/2020	12:27	9.541	10.99	45.478	0.102	
3/10/2020	12:28	8.621	11.793	57.433	0.097	
3/10/2020	12:29	8.578	11.77	56.766	0.097	
3/10/2020	12:30	9.169	11.21	51.734	0.095	
3/10/2020	12:31	9.442	11.045	46.145	0.092	
3/10/2020	12:32	8.567	11.775	56.047	0.093	
3/10/2020	12:33	9.211	11.164	49.248	0.083	
3/10/2020	12:34	9.866	10.533	41.021	0.087	
3/10/2020	12:35	10.237	10.255	35.68	0.093	
3/10/2020	12:36	10.385	10.095	37.481	0.087	
Run 8 Average		9.62	10.82	42.48	0.10	
3/10/2020	12:37	9.913	9.585	11.073	0.092	
3/10/2020	12:38	10.5	10.424	0.093	0.034	O2 CO2 Bias
3/10/2020	12:39	4.306	3.721	0.072	0.598	
3/10/2020	12:40	0.023	0.099	0.072	4.325	
3/10/2020	12:41	0.019	0.082	0.073	4.747	CO Bias
3/10/2020	12:42	0.018	0.073	30.748	4.012	
3/10/2020	12:43	0.016	0.068	47.468	0.584	
3/10/2020	12:44	1.062	0.062	37.997	0.375	
3/10/2020	12:45	-0.013	0.049	0.06	0.055	Zero
3/10/2020	12:46	7.612	8.611	42.52	1.48	
3/10/2020	12:47	10.526	10.49	47.678	4.668	
3/10/2020	12:48	10.525	10.489	47.662	4.747	Span

3/10/2020	12:49	10.741	9.885	73.213	3.552	
3/10/2020	12:50	10.434	10.133	53.906	0.251	
3/10/2020	12:51	10.057	10.388	40.47	0.135	
3/10/2020	12:52	10.323	10.175	40.391	0.145	
3/10/2020	12:53	10.344	10.066	37.814	0.147	
3/10/2020	12:54	11.253	9.306	35.02	0.144	
3/10/2020	12:55	10.367	10.066	38.868	0.154	
3/10/2020	12:56	11.495	9.01	31.401	0.153	
3/10/2020	12:57	11.592	8.936	32.842	0.158	
3/10/2020	12:58	10.868	9.643	67.562	0.153	
3/10/2020	12:59	10.997	9.47	75.326	0.138	
3/10/2020	13:00	10.514	10.079	53.878	0.144	
3/10/2020	13:01	9.834	10.562	39.465	0.158	
3/10/2020	13:02	9.347	11.115	48.667	0.143	
3/10/2020	13:03	8.533	11.885	57.209	0.128	
3/10/2020	13:04	8.541	11.897	58.999	0.118	
3/10/2020	13:05	7.499	12.989	65.479	0.121	
3/10/2020	13:06	6.697	13.742	58.196	0.567	
3/10/2020	13:07	7.373	12.827	64.646	4.936	
3/10/2020	13:08	8.711	11.666	64.016	0.163	
3/10/2020	13:09	9.078	11.353	57.558	0.085	
3/10/2020	13:10	9.529	10.875	50.426	0.088	
3/10/2020	13:11	10.192	10.205	38.425	0.091	
3/10/2020	13:12	10.937	9.537	27.427	0.103	
3/10/2020	13:13	10.484	10.051	35.966	0.108	
3/10/2020	13:14	9.626	10.837	43.347	0.098	
3/10/2020	13:15	8.056	12.427	59.029	0.095	
3/10/2020	13:16	8.898	11.474	49.975	0.108	
3/10/2020	13:17	9.032	11.281	50.224	0.088	
3/10/2020	13:18	9.195	11.235	55.006	0.082	
3/10/2020	13:19	8.917	11.493	59.422	0.076	
3/10/2020	13:20	8.812	11.576	60.109	0.081	
Run 9 Average		9.57	10.87	49.91	0.30	
3/10/2020	13:21	9.311	9.968	16.728	0.076	
3/10/2020	13:22	10.479	10.437	0.115	0.032	O2 CO2 Bias
3/10/2020	13:23	7.887	7.163	0.095	0.079	
3/10/2020	13:24	0.016	0.116	0.074	3.199	
3/10/2020	13:25	0.007	0.085	0.072	4.717	CO Bias
3/10/2020	13:26	0.005	0.075	17.157	4.612	
3/10/2020	13:27	0.001	0.07	47.454	1.163	NOx Bias
3/10/2020	13:28	-0.013	0.053	7.509	0.013	
3/10/2020	13:29	-0.014	0.048	0.042	0.005	Zero
3/10/2020	13:30	6.019	7.92	38.883	0.94	
3/10/2020	13:31	10.508	10.5	47.84	4.485	
3/10/2020	13:32	10.508	10.496	47.839	4.752	Span
3/10/2020	13:33	10.508	10.505	47.837	4.747	
3/10/2020	13:34	10.509	10.5	47.831	4.741	
3/10/2020	13:35	18.471	18.172	88.13	6.588	
3/10/2020	13:36	19.131	18.832	90.549	9.627	

3/10/2020	13:37	19.131	18.827	90.779	9.65	High

Appendix A.2.3
Unit 2 Instrument Strip Chart Data



Desert View Power unit 2 Ref #4 Dave Wuncky - Arden Bell
Patrick Whitman - Robert Hou

O2 0-21% Co2 0-20% NOx 0-100ppm CO 0-10ppm

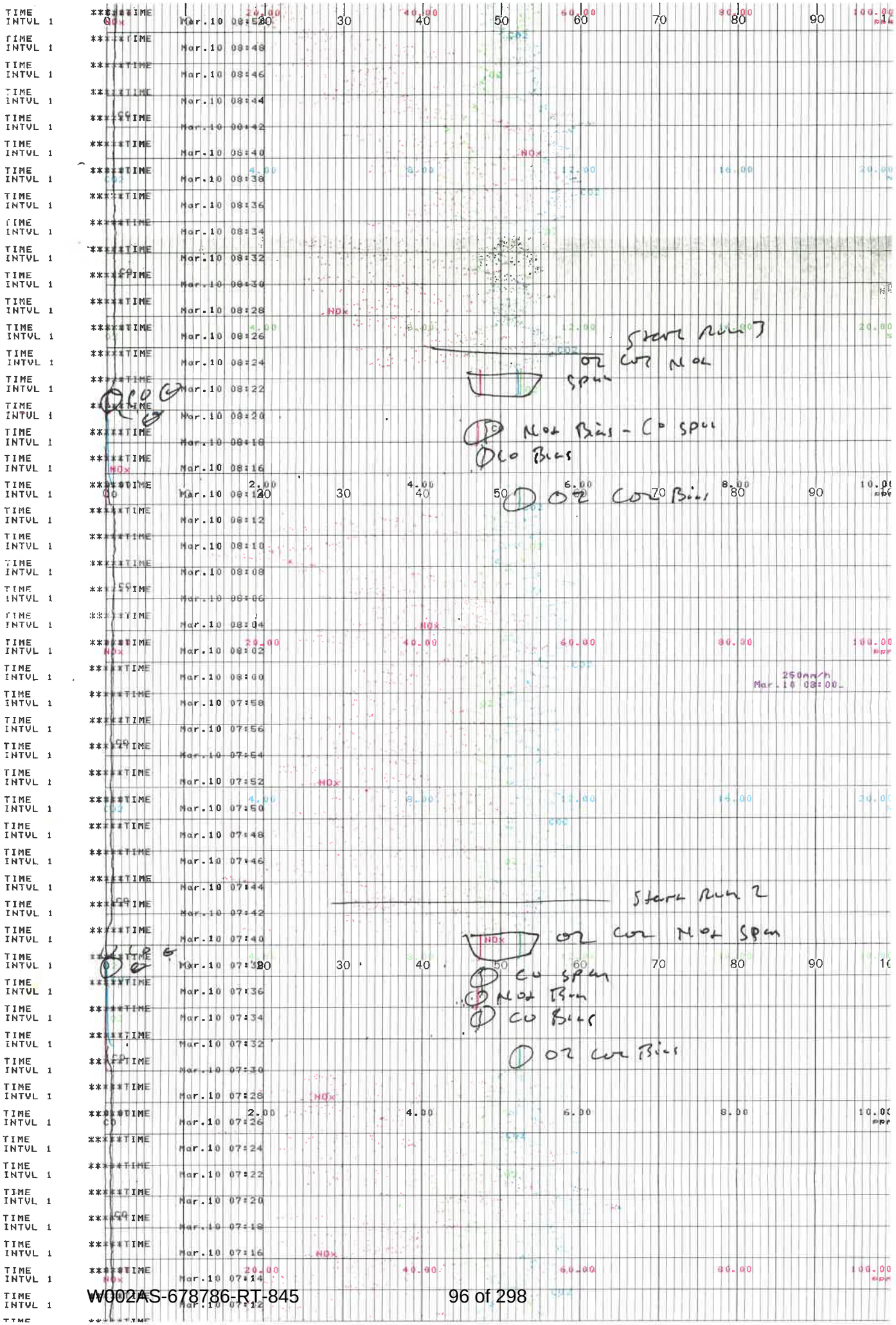
O2 - 10.48 NOx 47.3 - CC564467 CO - 4.74 - CC506605

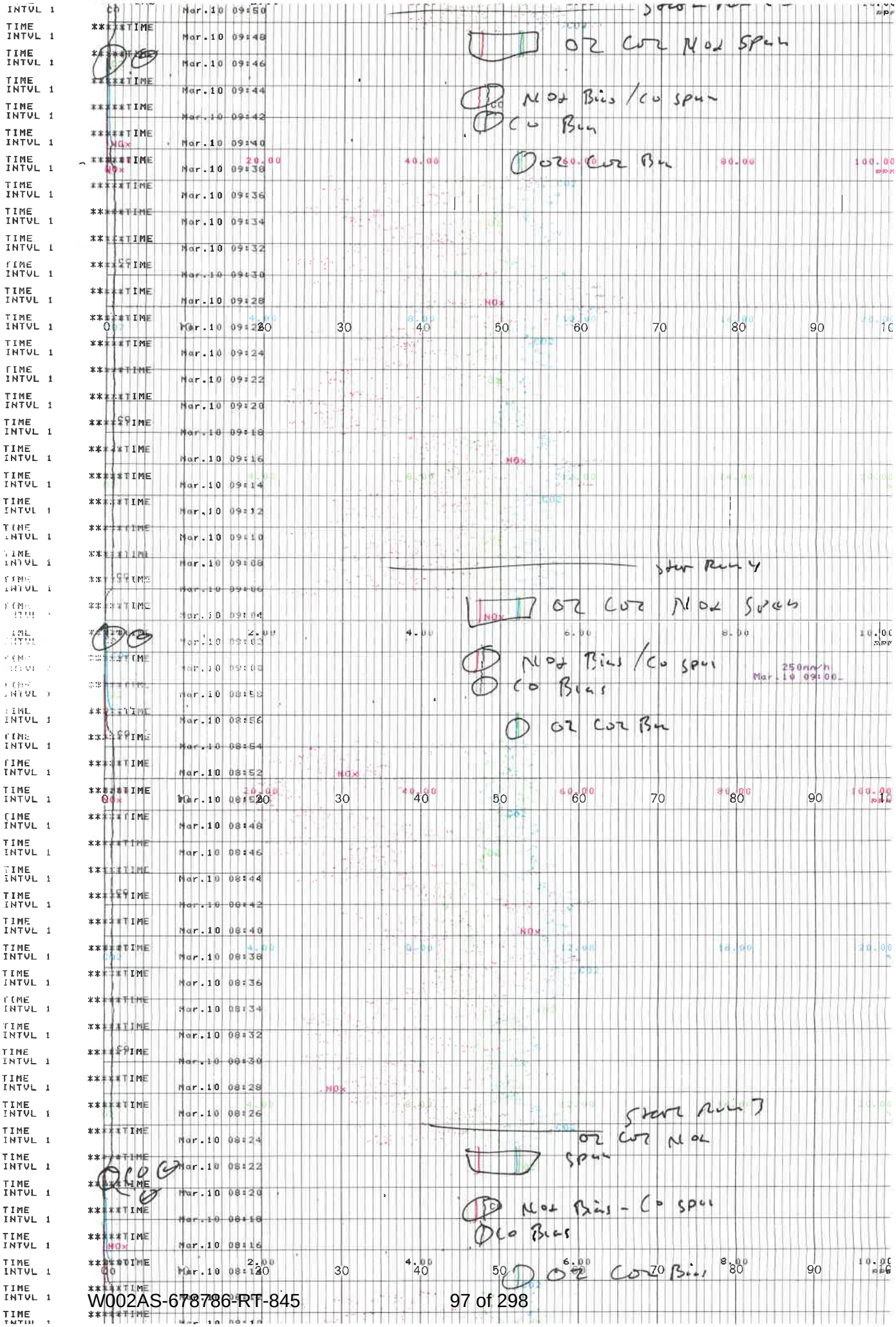
Co2 - 10.48 - AT0422871 NOx 90.4 - CC258464

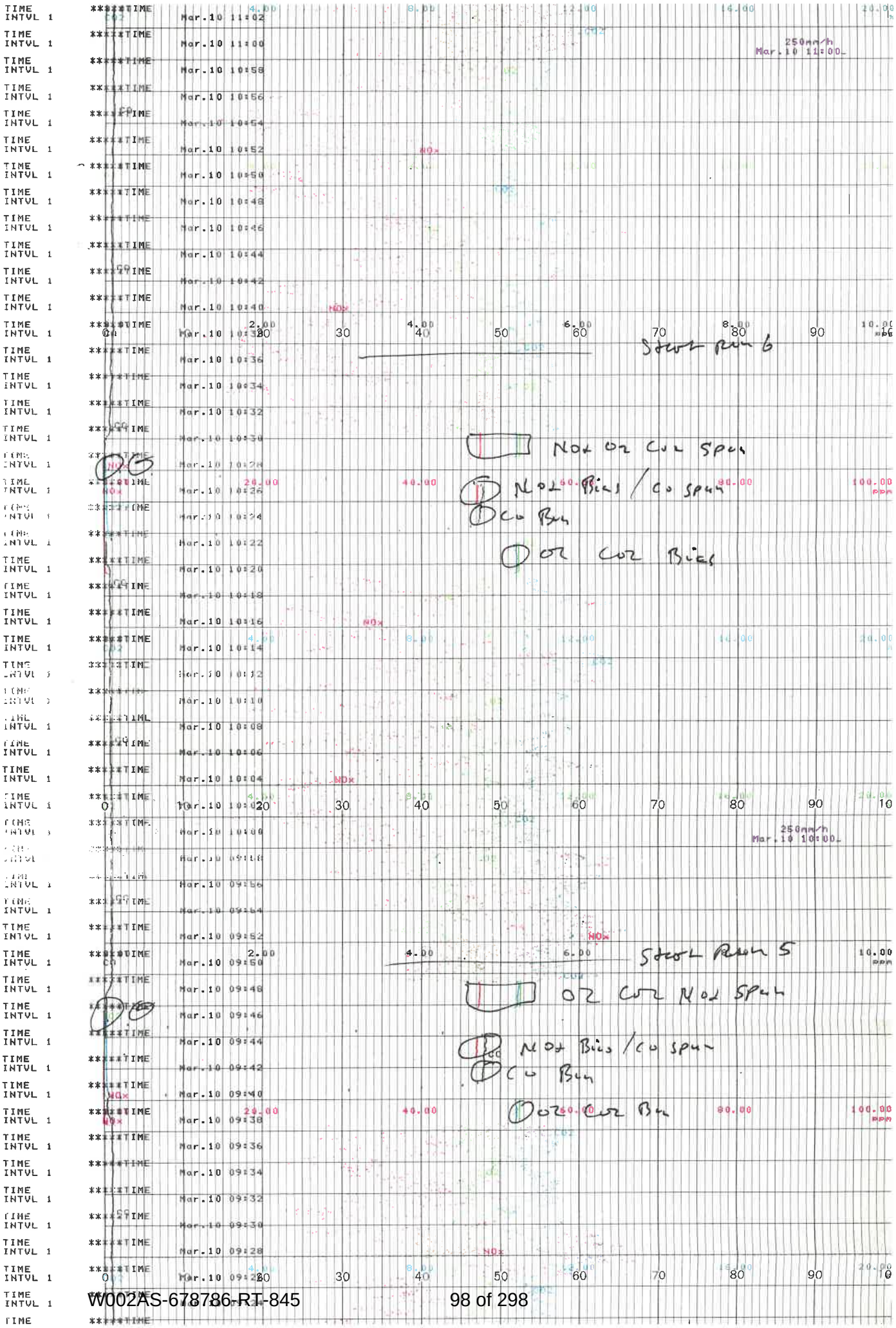
CO - 4.65 - SC415260

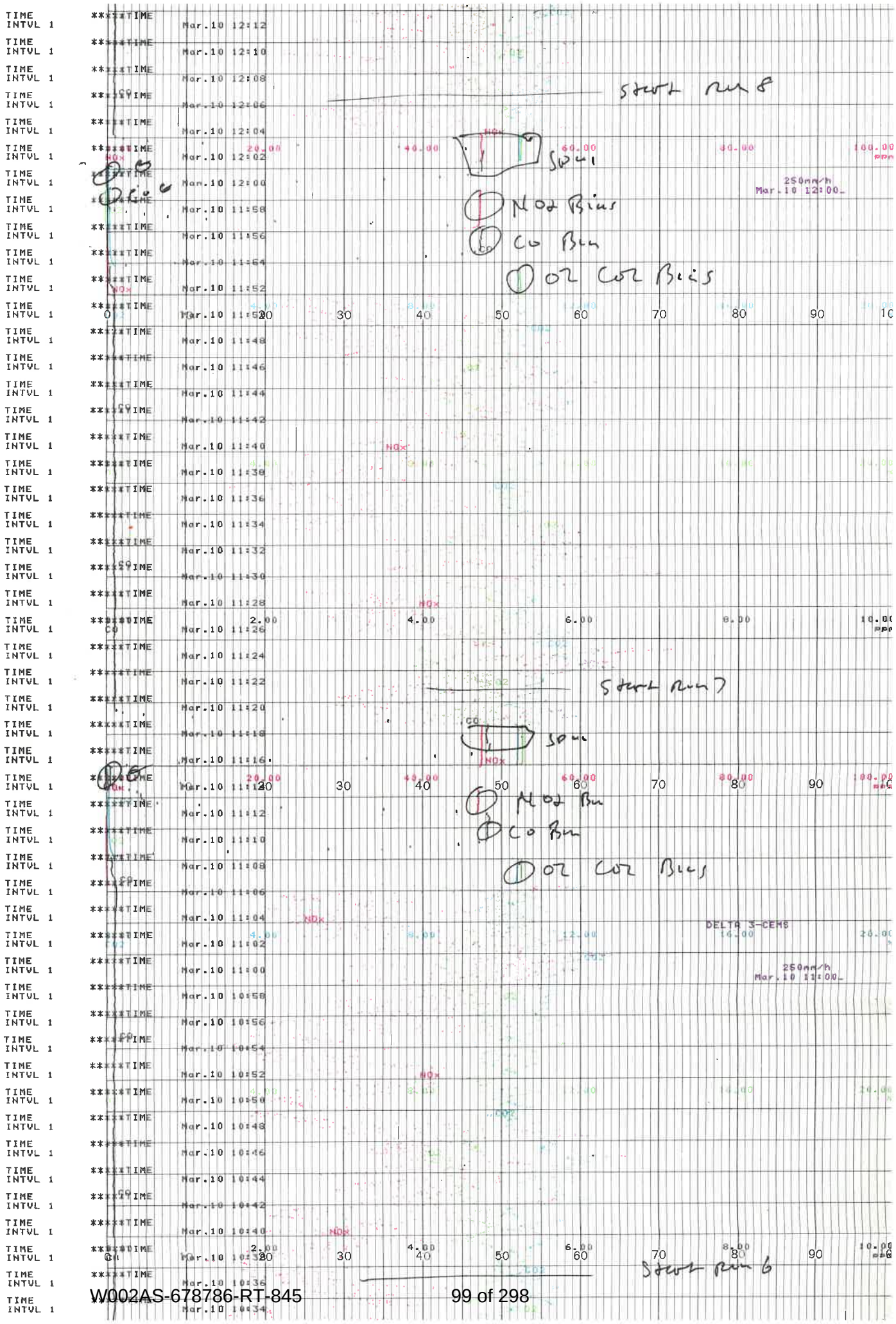
O2 - 19.65 NO2 - 44.9 - AT0417017

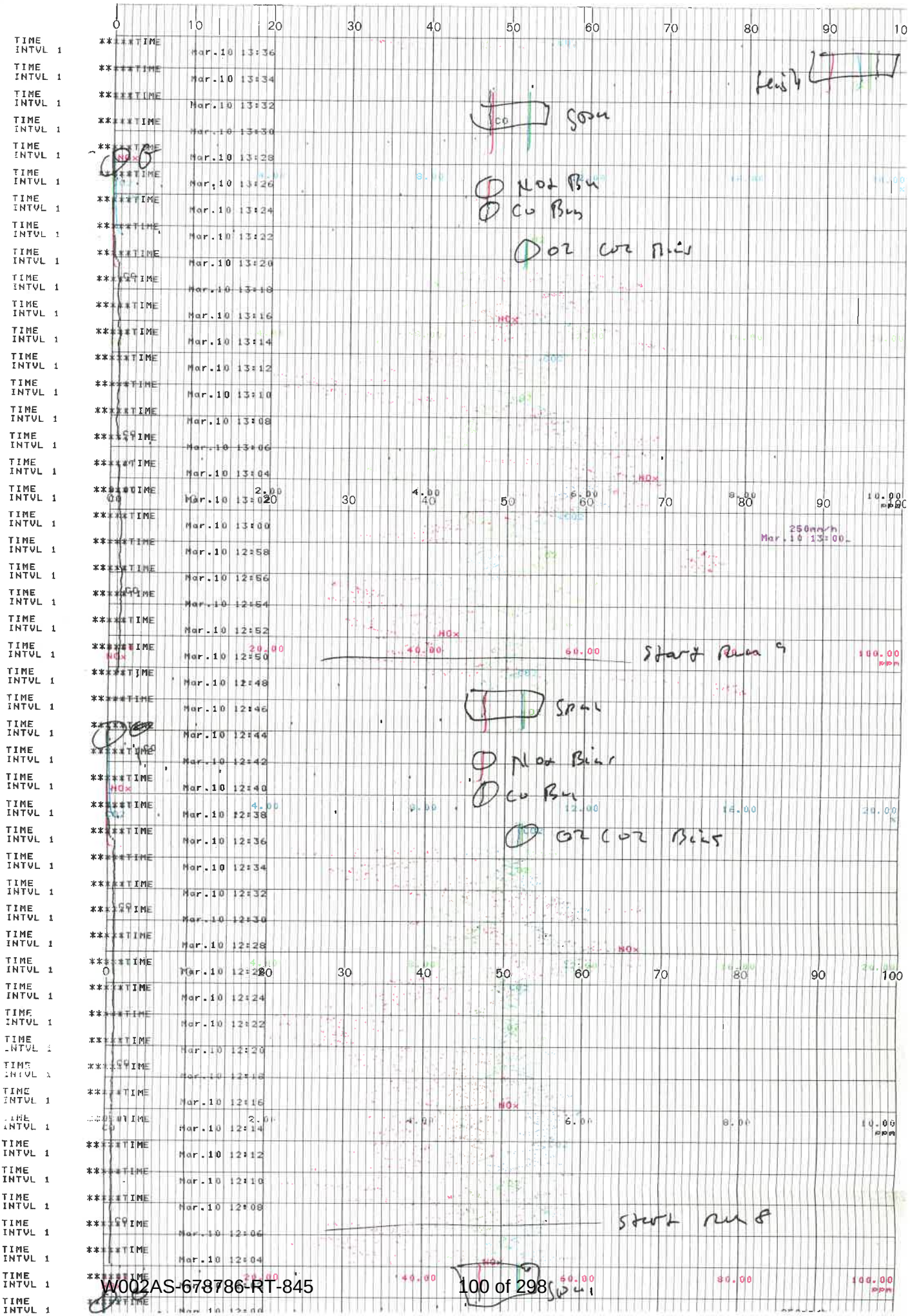
Co2 - 18.94 - AT0411381


TIME INTVL 1
Mar.10 08:52
Mar.10 08:48
Mar.10 08:46
Mar.10 08:44
Mar.10 08:42
Mar.10 08:40
Mar.10 08:38
Mar.10 08:36
Mar.10 08:34
Mar.10 08:32
Mar.10 08:30
Mar.10 08:28
Mar.10 08:26
Mar.10 08:24
Mar.10 08:22
Mar.10 08:20
Mar.10 08:18
Mar.10 08:16
Mar.10 08:12
Mar.10 08:10
Mar.10 08:08
Mar.10 08:06
Mar.10 08:04
Mar.10 08:02
Mar.10 08:00
Mar.10 07:58
Mar.10 07:56
Mar.10 07:54
Mar.10 07:52
Mar.10 07:50
Mar.10 07:48
Mar.10 07:46
Mar.10 07:44
Mar.10 07:42
Mar.10 07:40
Mar.10 07:38
Mar.10 07:36
Mar.10 07:34
Mar.10 07:32
Mar.10 07:30
Mar.10 07:28
Mar.10 07:26
Mar.10 07:24
Mar.10 07:22
Mar.10 07:20
Mar.10 07:18
Mar.10 07:16
Mar.10 07:14
Mar.10 07:12
NOx
CO
CO2
O2
20 30 40 50 60 70 80 90 100 ppm
4.00 8.00 12.00 16.00 20.00 %
2.00 4.00 6.00 8.00 10.00 ppm
20.00 40.00 60.00 80.00 100.00 ppm
250mm/h
Mar.10 08:00
Start Run 1
O2 CO2 NOx span
NOx Bias - CO span
CO Bias
O2 CO2 Bias
Start Run 2
O2 CO2 NOx span
CO span
NOx Bias
CO Bias
O2 CO2 Bias


O2 CO2 NOx Span
NOx Bias / CO span
CO Bias
O2 CO2 Bias
Start Run 4
O2 CO2 NOx Spans
NOx Bias / CO span
CO Bias
O2 CO2 Bias
Start Run 3
O2 CO2 NOx Span
NOx Bias - CO span
CO Bias
O2 CO2 Bias


TIME INTVL 1
Mar.10 11:02
Mar.10 11:00
250mm/h
Mar.10 11:00
Mar.10 10:58
Mar.10 10:56
Mar.10 10:54
Mar.10 10:52
Mar.10 10:50
Mar.10 10:48
Mar.10 10:46
Mar.10 10:44
Mar.10 10:42
Mar.10 10:40
Mar.10 10:38
Mar.10 10:36
Mar.10 10:34
Mar.10 10:32
Mar.10 10:30
Mar.10 10:28
Mar.10 10:26
Mar.10 10:24
Mar.10 10:22
Mar.10 10:20
Mar.10 10:18
Mar.10 10:16
Mar.10 10:14
Mar.10 10:12
Mar.10 10:10
Mar.10 10:08
Mar.10 10:06
Mar.10 10:04
Mar.10 10:02
Mar.10 10:00
250mm/h
Mar.10 10:00
Mar.10 09:58
Mar.10 09:56
Mar.10 09:54
Mar.10 09:52
Mar.10 09:50
Mar.10 09:48
Mar.10 09:46
Mar.10 09:44
Mar.10 09:42
Mar.10 09:40
Mar.10 09:38
Mar.10 09:36
Mar.10 09:34
Mar.10 09:32
Mar.10 09:30
Mar.10 09:28
Mar.10 09:26
NOx
CO
CO2
O2
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
20.00
20
30
40
50
60
70
80
90
10
20.00
40.00
60.00
80.00
100.00
ppm
Stack Run 6
NOx O2 CO2 Span
NOx Bias / CO Span
CO Bias
O2 CO2 Bias
Stack Run 5
O2 CO2 NOx Span
NOx Bias / CO Span
CO Bias
O2 CO2 Bias


TIME INTVL 1
Mar.10 12:12
Mar.10 12:10
Mar.10 12:08
Mar.10 12:06
Mar.10 12:04
Mar.10 12:02
Mar.10 12:00
Mar.10 11:58
Mar.10 11:56
Mar.10 11:54
Mar.10 11:52
Mar.10 11:50
Mar.10 11:48
Mar.10 11:46
Mar.10 11:44
Mar.10 11:42
Mar.10 11:40
Mar.10 11:38
Mar.10 11:36
Mar.10 11:34
Mar.10 11:32
Mar.10 11:30
Mar.10 11:28
Mar.10 11:26
Mar.10 11:24
Mar.10 11:22
Mar.10 11:20
Mar.10 11:18
Mar.10 11:16
Mar.10 11:14
Mar.10 11:12
Mar.10 11:10
Mar.10 11:08
Mar.10 11:06
Mar.10 11:04
Mar.10 11:02
Mar.10 11:00
Mar.10 10:58
Mar.10 10:56
Mar.10 10:54
Mar.10 10:52
Mar.10 10:50
Mar.10 10:48
Mar.10 10:46
Mar.10 10:44
Mar.10 10:42
Mar.10 10:40
Mar.10 10:38
Mar.10 10:36
Mar.10 10:34
NOx
CO
20.00
40.00
60.00
80.00
100.00
ppm
250mm/h
Mar.10 12:00
Start Run 8
Start Run 7
Start Run 6
Spike
NOx Bias
CO Bias
O2 Cor Bias
0
20
30
40
50
60
70
80
90
2.00
4.00
6.00
8.00
10.00
DELTA 3-CEMS
16.00
12.00
250mm/h
Mar.10 11:00


TIME INTVL 1
Mar.10 13:36
Mar.10 13:34
Mar.10 13:32
Mar.10 13:30
Mar.10 13:28
Mar.10 13:26
Mar.10 13:24
Mar.10 13:22
Mar.10 13:20
Mar.10 13:18
Mar.10 13:16
Mar.10 13:14
Mar.10 13:12
Mar.10 13:10
Mar.10 13:08
Mar.10 13:06
Mar.10 13:04
Mar.10 13:02
Mar.10 13:00
Mar.10 12:58
Mar.10 12:56
Mar.10 12:54
Mar.10 12:52
Mar.10 12:50
Mar.10 12:48
Mar.10 12:46
Mar.10 12:44
Mar.10 12:42
Mar.10 12:40
Mar.10 12:38
Mar.10 12:36
Mar.10 12:34
Mar.10 12:32
Mar.10 12:30
Mar.10 12:28
Mar.10 12:26
Mar.10 12:24
Mar.10 12:22
Mar.10 12:20
Mar.10 12:18
Mar.10 12:16
Mar.10 12:14
Mar.10 12:12
Mar.10 12:10
Mar.10 12:08
Mar.10 12:06
Mar.10 12:04
Mar.10 12:00
NOx
CO
250mm/h
Mar.10 13:00
Start Run 9
Spark
Start Run 8

Appendix A.2.4
Unit 2 SO_2 Data and Velocity Data

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 1 Ps: 1.33
Start: 0700 Stop: 0730

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.2	357	5	1.3	349	5	.98	352
4, 45.9"	1.3	352	4	1.1	350	4	.94	353
3, 36.5"	1.1	353	3	.83	351	3	.86	355
2, 27.1"	1.0	353	2	.81	352	2	.82	356
1, 17.7	1.1	352	1	.78	351	1	.61	357
5	1.3	357	5	.84	348	5	.63	351
4	1.1	352	4	.80	349	4	.59	352
3	1.0	357	3	.85	350	3	.57	353
2	1.2	354	2	.81	351	2	.55	355
1	1.0	351	1	.82	352	1	.58	351
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	250	251		306	00.7			
2	255	256						
3	257	252						

MOISTURE DATA FOR TEST RUNS 1 THROUGH 1

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0700	606.630	2.5	77	78	50	11"	#1	H_2O_2	871.8	746.8	
0710	615.680	2.5	75	71	52	11"	#2	H_2O_2	690.3	689.4	
0720	624.755	2.5	75	71	53	11"	#3	Empty	689.0	609.1	
0730	633.673						#4	Silica Gel	1010.7	997.3	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.005 CFM @ 21 in. Hg., Post-Test Leak Check: 0.005 CFM @ 22 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power | LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman | TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21 | TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS | TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer | PITOT TUBE ID: #043 | Cp: 0.84
ZERO: ✓ LEVEL: ✓ | LEAK CHECK PRE- ✓ POST- ✓

Run #: 2 Ps: 4.33
Start: 0743 Stop: 0813

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.2	352	5	1.2	353	5	1.0	355
4, 45.9"	1.3	353	4	1.0	352	4	.93	356
3, 36.5"	1.0	355	3	.86	353	3	.82	357
2, 27.1"	1.1	354	2	.82	354	2	.80	355
1, 17.7	1.1	354	1	.80	355	1	.63	354
5	1.4	353	5	.85	355	5	.65	253
4	1.1	354	4	.81	352	4	.61	352
3	1.0	355	3	.83	357	3	.58	353
2	1.1	356	2	.82	358	2	.55	352
1	1.0	355	1	.81	355	1	.50	351
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	255	258		302	33.5			
2	253	258						
3	258	257						

MOISTURE DATA FOR TEST RUNS 2 THROUGH 2

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0743	634.600	2.5	73	70	51	10"	#1	H_2O_2	869.7	734.9	
0753	643.765	2.5	73	70	52	10"	#2	H_2O_2	662.3	661.3	
0803	652.720	2.5	74	71	53	10"	#3	Empty	651.0	652.0	
0813	661.637						#4	Silica Gel	923.5	911.3	
							Total	Line rinse		50	

Pre-Test Leak Check: <2.005 CFM @ 21 in. Hg., Post-Test Leak Check: <2.005 CFM @ 21 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓
LEVEL: ✓
LEAK CHECK PRE- ✓
POST- ✓

Run #: 3 Ps: 4.33
Start: 0825 Stop: 0855

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.3	353	5	1.2	350	5	1.0	350
4, 45.9"	1.2	353	4	1.1	349	4	.91	352
3, 36.5"	1.0	352	3	1.0	350	3	.82	352
2, 27.1"	1.1	352	2	.97	352	2	.85	353
1, 17.7	1.1	352	1	.81	351	1	.67	352
5	1.3	351	5	1.1	350	5	.66	353
4	1.2	352	4	1.0	348	4	.57	352
3	1.0	352	3	1.0	348	3	.54	351
2	1.1	351	2	.94	349	2	.59	352
1	1.1	352	1	.83	348	1	.61	352
	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	259	253		299	00.4			
2	258	252						
3	259	251						

MOISTURE DATA FOR TEST RUNS 3 THROUGH 3

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0825	663.500	2.5	74	73	55	10"	#1	H_2O_2	822.0	750.0	
0835	672.385	2.5	76	73	52	10"	#2	H_2O_2	625.7	674.2	
0845	681.770	2.5	77	75	54	10"	#3	Empty	610.3	610.2	
0855	690.524						#4	Silica Gel	1015.6	1014.7	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓
LEVEL: ✓
LEAK CHECK PRE- ✓
POST- ✓

Run #: 1
Ps: 1.33
Start: 0908
Stop: 0938

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.3	354	5	1.3	355	5	1.1	350
4, 45.9"	1.1	355	4	1.1	356	4	1.0	352
3, 36.5"	1.0	356	3	.85	357	3	.88	351
2, 27.1"	1.1	355	2	.96	358	2	.85	353
1, 17.7	1.2	354	1	.82	355	1	.66	354
5	1.4	355	5	.85	354	5	.69	355
4	1.2	358	4	.86	356	4	.63	356
3	1.2	358	3	.83	357	3	.57	357
2	1.0	357	2	.88	355	2	.55	358
1	1.1	356	1	.94	354	1	.58	356

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	253	252		305	03.5			
2	255	251						
3	257	255						

MOISTURE DATA FOR TEST RUNS ~~1~~ **THROUGH** ~~3~~ 4/4

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T_{imp}	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0908	692.000	2.5	78	74	55	10"	#1	H_2O_2	855.8	730.0	
0918	701.230	2.5	79	73	50	10"	#2	H_2O_2	646.9	644.1	
0928	710.060	2.5	78	75	48	10"	#3	Empty	652.5	651.3	
0938	718.968						#4	Silica Gel	927.5	923.5	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.005 CFM @ 20 in. Hg., Post-Test Leak Check: 0.003 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 5 Ps: 1.33
Start: 0950 Stop: 1020

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.4	346	5	1.4	355	5	1.2	352
4, 45.9"	1.2	349	4	1.2	356	4	1.0	353
3, 36.5"	1.0	350	3	.98	357	3	.91	354
2, 27.1"	1.0	351	2	.93	355	2	.84	355
1, 17.7	1.1	350	1	.84	354	1	.62	352
5	1.3	352	5	.96	355	5	.73	351
4	1.1	352	4	.90	354	4	.61	353
3	1.0	351	3	.87	353	3	.55	352
2	1.1	350	2	.88	354	2	.52	355
1	1.0	350	1	.90	355	1	.56	352

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C
1	254	255		303	02.6
2	256	253			
3	258	253			

MOISTURE DATA FOR TEST RUNS 5 THROUGH 5

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
0950	720.200	2.5	76	75	53	10"	#1	H_2O_2	788.8	667.8	
1000	729.275	2.5	78	75	50	10"	#2	H_2O_2	721.7	720.0	
1010	738.255	2.5	76	75	54	10"	#3	Empty	607.9	607.6	
1020	747.188						#4	Silica Gel	1025.1	1015.6	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓
LEVEL: ✓
LEAK CHECK PRE- ✓
POST- ✓

Run #: 6
Ps: -.33
Start: 1037
Stop: 1107

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.3	348	5	1.3	352	5	1.2	353
4, 45.9"	1.1	349	4	1.1	353	4	1.1	354
3, 36.5"	1.2	350	3	1.0	354	3	.93	355
2, 27.1"	1.0	351	2	.96	353	2	.82	355
1, 17.7	1.0	351	1	.80	352	1	.60	352
5	1.2	352	5	.94	351	5	.72	353
4	1.3	352	4	.92	353	4	.64	354
3	1.1	353	3	.86	354	3	.55	353
2	1.1	353	2	.87	355	2	.53	352
1	1.0	351	1	.89	352	1	.55	350

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C			
1	251	253		303	00.6			
2	252	254						
3	254	251						

MOISTURE DATA FOR TEST RUNS 6 THROUGH 6

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1037	748.500	2.5	76	75	52	10"	#1	H_2O_2	852.3	730.2	
1047	757.515	2.5	76	74	51	10"	#2	H_2O_2	651.8	649.9	
1057	766.610	2.5	77	75	53	10"	#3	Empty	650.3	650.0	
1107	775.203						#4	Silica Gel	937.7	927.5	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.005 CFM @ 20 in. Hg., Post-Test Leak Check: 0.003 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 7-56 Ps: 33
Start: 1121 Stop: 1151

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.2	351	5	1.3	353	5	1.2	352
4, 45.9"	1.0	352	4	1.2	354	4	1.0	353
3, 36.5"	1.2	353	3	1.0	355	3	.94	354
2, 27.1"	1.1	352	2	.96	356	2	.86	355
1, 17.7	1.0	351	1	.79	352	1	.62	356
5	1.3	353	5	.93	353	5	.71	357
4	1.1	354	4	.87	354	4	.66	355
3	1.2	355	3	.85	355	3	.57	356
2	1.1	353	2	.81	356	2	.52	355
1	1.0	352	1	.88	357	1	.54	354

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C
1	253	252		309	27.5
2	256	257			
3	255	251			

MOISTURE DATA FOR TEST RUNS 7 THROUGH 7

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1121	776.300	2.5	78	76	55	10"	#1	H_2O_2	807.8	685.6	
1131	785.410	2.5	79	77	53	10"	#2	H_2O_2	753	753.4	
1141	794.555	2.5	79	78	58	10"	#3	Empty	607.4	607.5	
1151	803.382						#4	Silica Gel	1033.2	1025.8	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓
LEVEL: ✓
LEAK CHECK PRE- ✓
POST- ✓

Run #: 8S2
Ps: 1.33
Start: 1206
Stop: 1236

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.2	352	5	1.2	352	5	1.1	354
4, 45.9"	1.2	352	4	1.3	354	4	1.0	354
3, 36.5"	1.1	352	3	1.1	354	3	.96	356
2, 27.1"	1.0	351	2	.94	355	2	.88	354
1, 17.7	1.1	350	1	.82	352	1	.60	355
5	1.3	353	5	.97	353	5	.77	358
4	1.2	353	4	.85	352	4	.68	355
3	1.1	354	3	.84	354	3	.52	355
2	1.0	355	2	.85	355	2	.49	354
1	1.1	352	1	.84	355	1	.53	353

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C
1	254	256		304	20.5
2	258	252			
3					

MOISTURE DATA FOR TEST RUNS 8 THROUGH 8

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1206	804.500	2.5	79	77	53	10"	#1	H_2O_2	859.7	735.5	
1216	813.715	2.5	78	76	45	10"	#2	H_2O_2	650.6	648.7	
1226	822.810	2.5	78	76	46	10"	#3	Empty	652.3	651.3	
1236	831.934						#4	Silica Gel	940.0	937.7	
							Total	Line rinse		50	

Pre-Test Leak Check: 0.005 CFM @ 20 in. Hg., Post-Test Leak Check: 0.005 CFM @ 20 in. Hg

FLUE GAS VELOCITY AND MOISTURE DATA AND WORKSHEET

CLIENT: Desert View Power
LOCATION/UNIT: Unit - 2
PERFORMED BY: Patrick Whitman
TEST DATE: 3/10/2020
BAR. PRESSURE: 30.21
TC READOUT ID: 17-WCS
DP INDICATOR ID: 17-WCS
TC ID: #043
DP INDICATOR TYPE: 0-10" Manometer
PITOT TUBE ID: #043
Cp: 0.84
ZERO: ✓ LEVEL: ✓
LEAK CHECK PRE- ✓ POST- ✓

Run #: 9-50x Ps: 4.33
Start: 1250 Stop: 1320

Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F	Sample Point	Velocity Head inches H_2O	Temp, °F
5, 55.3"	1.2	354	5	1.2	349	5	1.2	352
4, 45.9"	1.3	353	4	1.2	350	4	1.0	351
3, 36.5"	1.0	352	3	1.1	354	3	.90	354
2, 27.1"	1.1	351	2	.94	353	2	.84	353
1, 17.7	1.0	352	1	.82	353	1	.63	353
5	1.2	354	5	1.0	356	5	.76	356
4	1.1	353	4	.86	355	4	.68	357
3	1.2	351	3	.82	355	3	.53	357
2	1.2	352	2	.87	353	2	.55	355
1	1.0	351	1	.85	357	1	.57	354

	Probe Temp. °F	Filter Temp. °C		Heated Line Temp. °F	Chiller Temp. °C
1	253	254		305	20.5
2	256	252			
3	252	254			

MOISTURE DATA FOR TEST RUNS 9 THROUGH 9

METER ID: 17-WCS METER Yd: 0.992 BALANCE CHECK WEIGHT: 500.0/ 500

Dry Gas Meter							Impinger Data				
Time	Volume	Delta H	Tm (in)	Tm (out)	T imp	Vacuum	No.	Material	End Wt.	Start Wt.	Diff.
1250	833.100	2.5	78	76	53	10"	#1	H_2O_2	892.8	760.2	
1300	842.035	2.5	72	74	50	10"	#2	H_2O_2	673.7	672.9	
1310	850.945	2.5	71	72	52	10"	#3	Empty	607.3	606.6	
1320	859.971						#4	Silica Gel	1044.3	1033.7	
							Total	Line rinse		50	

Pre-Test Leak Check: <0.005 CFM @ 20 in. Hg., Post-Test Leak Check: <0.005 CFM @ 21 in. Hg

MONTROSE

SULFATE TITRATION

Project #
Client/Location QVP
Sample Location Unit 2
Titrant Used 0.01 N $BaCl_2$

Sample Date 3/10/20
Analysis Date 3/10/20
Analyst Initials

Test Number	Sample Description	Total Vol (ml) (TV)	V_{recon}	V_{evap}	Aliquot Vol (ml) (Va)	Titrant Volume (ml) (Vt)	X-Blank Vol (ml)	Comments	mg/Sample
Blank (V_b): 20 mL 3% H_2O_2 + 80 mL IPA					20 ml	0.05 / 0.05	0.05	Use w/ sample	
Blank (V_b): 20 mL DI H_2O + 80 mL IPA					20 ml	0.04 / 0.05	0.05	Use w/ standard N = (0.02*Va)/Vt	
Standardization: 15 ml DI H_2O + 5 ml 0.0200 N H_2SO_4 + 80 mL IPA					5 ml	10.37 / 10.38	10.33	N= 0.0096805	
Audit Sample: 5 ml 1000 ppm SO_4 + 15 DI H_2O + 80 mL IPA					5 ml	10.40 / 10.39	10.35	96.2 4.81/5.0 % recovery	
1-SOx	Ty Cadel	492			20 ml	1.22 / 1.26	1.19		
2-SOx	Ty Cadel	519			20 ml	1.94 / 1.95	1.90		
3-SOx	Ty Cadel	393			20 ml	3.45 / 3.46	3.41		
4-SOx	Ty Cadel	455			20 ml	3.48 / 3.49	3.44		
5-SOx	Ty Cadel	374			20 ml	2.68 / 2.72	2.65		
6-SOx	Ty Cadel	507			20 ml	0.94 / 0.92	0.88		
7-SOx	Ty Cadel	425			20 ml	2.84 / 2.88	2.81		
8-SOx	Ty Cadel	457			20 ml	3.14 / 3.16	3.11		
9-SOx	Ty Cadel	458			20 ml	3.37 / 3.35	3.31		
					mg $H_2SO_4 \cdot 2H_2O$ = (Vt-Vbl) (N) (67) (TV/V_{evap}) (V_{recon}/Va)				

Method of Sample Prep/Analysis Notes

DS1580127

Appendix A.2.5
Unit 2 Plant Data

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 7:01	38.93	62.11	24.56	1.11	1.77	0.97	2.4	15.95 <56>	3.84 <56>	11.15	9.68	5284	3.83	0.92
3/10/2020 7:02	32.58	50.4	21	0.98	1.52	0.88	2.39	15.47 <56>	3.92 <56>	11.52	9.33	5398	3.70	0.94
3/10/2020 7:03	37.67	60.47	23.52	1.18	1.89	1.03	2.43	16.05 <56>	3.80 <56>	11.08	9.75	5230	3.90	0.92
3/10/2020 7:04	35.91	57.34	22.91	1.03	1.64	0.91	2.46	15.97 <56>	3.88 <56>	11.16	9.69	5344	3.93	0.96
3/10/2020 7:05	29.21	48.01	18.15	0.94	1.55	0.81	2.24	16.44 <56>	3.78 <56>	10.84	10.01	5204	3.68	0.65
3/10/2020 7:06	30.38	47.87	19.66	0.88	1.39	0.79	2.35	15.76 <56>	3.94 <56>	11.32	9.54	5421	3.70	0.93
3/10/2020 7:07	30.05	48.33	19.03	1.2	1.93	1.06	2.37	16.08 <56>	3.86 <56>	11.05	9.77	5305	3.81	0.91
3/10/2020 7:08	32.79	51.31	21.27	1.35	2.11	1.22	2.4	15.65 <56>	3.95 <56>	11.37	9.46	5433	3.76	0.95
3/10/2020 7:09	36.75	56.76	24.14	1.99	3.07	1.82	2.3	15.44 <56>	4.00 <56>	11.47	9.31	5501	3.55	0.92
3/10/2020 7:10	34.85	56.35	21.51	3.06	4.95	2.63	2.31	16.17 <56>	3.76 <56>	10.99	9.83	5171	3.74	0.87
3/10/2020 7:11	47.31	68.96	32.56	4.25	6.20	4.07	2.44	14.58 <56>	4.19 <56>	12.11	8.62	5765	3.56	1.02
3/10/2020 7:12	42.45	71.21	25.8	4.94	8.29	4.18	2.31	16.78 <56>	3.70 <56>	10.48	10.23	5091	3.88	0.85
3/10/2020 7:13	25.56	43.57	15.51	2.68	4.57	2.26	2.17	17.05 <56>	3.69 <56>	10.48	10.4	5084	3.70	0.80
3/10/2020 7:14	36.14	62.68	21.76	3.05	5.29	2.56	2.17	17.34 <56>	3.67 <56>	10.21	10.58	5044	3.76	0.80
3/10/2020 7:15	36.24	57.61	23.35	3.29	5.23	2.95	2.23	15.90 <56>	3.92 <56>	11.18	9.64	5396	3.65	0.87
3/10/2020 7:16	41.02	65.15	26.42	5.32	8.45	4.77	2.19	15.88 <56>	3.92 <56>	11.13	9.63	5394	3.48	0.86
3/10/2020 7:17	35.01	54.02	23.07	4.2	6.48	3.85	2.15	15.43 <56>	4.01 <56>	11.48	9.3	5519	3.32	0.86
3/10/2020 7:18	35.57	55.66	22.84	4.38	6.85	3.91	2.17	15.65 <56>	3.91 <56>	11.33	9.46	5379	3.40	0.85
3/10/2020 7:19	42.81	66.06	27.61	5.4	8.33	4.85	2.16	15.43 <56>	3.93 <56>	11.45	9.3	5403	3.33	0.85
3/10/2020 7:20	48.67	69.64	33.45	9.55	13.66	9.13	2.26	14.31 <56>	4.18 <56>	12.38	8.39	5756	3.23	0.95
3/10/2020 7:21	53.29	80.43	34.29	11.76	17.75	10.53	2.11	15.09 <56>	3.92 <56>	11.69	9.04	5390	3.18	0.83
3/10/2020 7:22	48.75	75.68	30.93	8.64	13.41	7.63	2.09	15.52 <56>	3.86 <56>	11.35	9.37	5314	3.24	0.81
3/10/2020 7:23	39.33	63.71	24.02	6.36	10.3	5.4	1.93	16.20 <56>	3.72 <56>	10.95	9.85	5116	3.13	0.72
3/10/2020 7:24	46.79	71.4	30.56	8.3	12.67	7.54	2.04	15.26 <56>	3.98 <56>	11.62	9.17	5470	3.11	0.81
3/10/2020 7:25	40.4	65.68	25.12	7.49	12.18	6.48	1.96	16.26 <56>	3.78 <56>	10.87	9.89	5208	3.19	0.74
3/10/2020 7:26	31.26	52.15	18.84	5.05	8.42	4.23	1.98	16.68 <56>	3.67 <56>	10.66	10.17	5047	3.30	0.73
3/10/2020 7:27	42.8	67.68	27.57	7.16	11.32	6.42	2.07	15.81 <56>	3.92 <56>	11.18	9.58	5395	3.27	0.81
3/10/2020 7:28	32.59	53.08	20.31	5.31	8.65	4.6	1.98	16.29 <56>	3.79 <56>	10.9	9.91	5221	3.22	0.75
3/10/2020 7:29	34.78	55.84	21.9	5.21	8.36	4.57	1.97	16.05 <56>	3.83 <56>	11.06	9.75	5275	3.16	0.76
3/10/2020 7:30	39.17	62.77	24.93	6.8	10.9	6.02	1.83	16.03 <56>	3.87 <56>	11.01	9.73	5330	2.93	0.71
Average	**37.97**	**60.06**	**24.22**	**4.43**	**6.97**	**3.94**	**2.20**			**11.18**	**9.61**	**5329.60**	**3.48**	**0.85**

Flow	kdscfh	5329.60
O2	% dry	9.61
CO2	% dry	11.18
NOx	ppm dry	37.97
NOx	ppm @ 3% O2	60.06
NOx	lb/hr	24.22
SO2	ppm dry	4.43
SO2	ppm @ 3% O2	6.97
SO2	lb/hr	3.94
CO	ppm dry	2.20
CO	ppm @ 3% O2	3.48
CO	lb/hr	0.85

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 7:44	41.47	64.49	26.57	6.2	9.64	5.53	1.89	15.55 <56>	3.90 <56>	11.4	9.39	5366	2.94	0.74
3/10/2020 7:45	37.44	61.71	23.22	6.84	11.27	5.9	1.88	16.48 <56>	3.78 <56>	10.7	10.04	5195	3.10	0.71
3/10/2020 7:46	25.82	42.83	16.11	4.54	7.53	3.94	1.92	16.59 <56>	3.80 <56>	10.74	10.11	5225	3.19	0.73
3/10/2020 7:47	32.16	52.43	19.97	5.61	9.15	4.85	1.86	16.30 <56>	3.78 <56>	10.91	9.92	5202	3.03	0.70
3/10/2020 7:48	42.13	65.86	27.76	7.64	11.94	7	1.92	15.63 <56>	4.01 <56>	11.3	9.45	5519	3.00	0.77
3/10/2020 7:49	30.88	53.05	18.52	5.76	9.89	4.81	1.83	17.18 <56>	3.65 <56>	10.33	10.48	5024	3.14	0.67
3/10/2020 7:50	40.24	64.72	25.55	6.6	10.61	5.83	1.99	16.08 <56>	3.87 <56>	11.01	9.77	5319	3.20	0.77
3/10/2020 7:51	41.63	65.19	26.86	7.34	11.49	6.59	1.99	15.66 <56>	3.93 <56>	11.3	9.47	5405	3.12	0.78
3/10/2020 7:52	40.87	64.68	26.32	7.8	12.34	6.99	1.86	15.83 <56>	3.92 <56>	11.18	9.59	5394	2.94	0.73
3/10/2020 7:53	37.19	60.46	23.39	6.57	10.68	5.75	1.92	16.26 <56>	3.83 <56>	10.89	9.89	5268	3.12	0.74
3/10/2020 7:54	32.99	55.09	20.25	6.02	10.05	5.14	1.89	16.70 <56>	3.74 <56>	10.65	10.18	5142	3.16	0.71
3/10/2020 7:55	38.64	61.87	24.67	6.74	10.79	5.99	1.88	16.01 <56>	3.89 <56>	11.08	9.72	5347	3.01	0.73
3/10/2020 7:56	37.79	61.89	23.5	7.47	12.23	6.46	1.77	16.38 <56>	3.78 <56>	10.79	9.97	5208	2.90	0.67
3/10/2020 7:57	44.3	70.24	28.51	8.04	12.75	7.2	1.93	15.85 <56>	3.92 <56>	11.16	9.61	5390	3.06	0.76
3/10/2020 7:58	39.73	63.33	25.44	7.57	12.07	6.74	1.87	15.94 <56>	3.90 <56>	11.12	9.67	5363	2.98	0.73
3/10/2020 7:59	42.11	69.41	26.3	7.86	12.96	6.83	1.86	16.48 <56>	3.80 <56>	10.73	10.04	5232	3.07	0.71
3/10/2020 8:00	41.72	67.52	26.25	7.17	11.6	6.28	1.75	16.18 <56>	3.83 <56>	10.96	9.84	5270	2.83	0.67
3/10/2020 8:01	42.62	67.57	27.45	8.15	12.92	7.3	1.94	15.85 <56>	3.92 <56>	11.19	9.61	5394	3.08	0.76
3/10/2020 8:02	47.13	73.42	30.45	9.47	14.75	8.51	1.98	15.58 <56>	3.93 <56>	11.34	9.41	5412	3.08	0.76
3/10/2020 8:03	48.84	76.75	31.31	10.26	16.12	9.15	1.94	15.72 <56>	3.90 <56>	11.25	9.51	5369	3.05	0.76
3/10/2020 8:04	36.61	60.45	22.18	9.36	15.46	7.89	1.89	16.51 <56>	3.69 <56>	10.75	10.06	5075	3.12	0.70
3/10/2020 8:05	42.63	65.95	27.48	11.01	17.03	9.88	1.95	15.47 <56>	3.92 <56>	11.45	9.33	5400	3.02	0.77
3/10/2020 8:06	44.81	69.69	28.57	12.48	19.41	11.07	1.93	15.55 <56>	3.88 <56>	11.37	9.39	5340	3.00	0.75
3/10/2020 8:07	39.72	63.2	24.58	10.73	17.07	9.24	1.94	15.91 <56>	3.77 <56>	11.11	9.65	5183	3.09	0.73
3/10/2020 8:08	43.83	67.46	27.91	12.46	19.18	11.04	2.05	15.39 <56>	3.88 <56>	11.49	9.27	5333	3.16	0.79
3/10/2020 8:09	37.92	62.44	23.11	10.65	17.54	9.03	2	16.47 <56>	3.71 <56>	10.73	10.03	5104	3.29	0.74
3/10/2020 8:10	23.99	43.38	13.84	6.98	12.62	5.6	1.83	18.08 <56>	3.51 <56>	9.84	11	4831	3.31	0.64
3/10/2020 8:11	29.94	49.26	18.61	6.97	11.47	6.03	1.86	16.45 <56>	3.78 <56>	10.81	10.02	5207	3.06	0.70
3/10/2020 8:12	36.7	60.44	22.95	9.54	15.71	8.3	1.98	16.47 <56>	3.81 <56>	10.76	10.03	5239	3.26	0.75
3/10/2020 8:13	38.01	62.08	23.74	8.88	14.5	7.72	1.93	16.33 <56>	3.80 <56>	10.87	9.94	5232	3.15	0.73
Average	**38.66**	**62.23**	**24.38**	**8.09**	**13.03**	**7.09**	**1.91**			**10.97**	**9.81**	**5266.27**	**3.08**	**0.73**

Flow	kdscfh	5266.27
O2	% dry	9.81
CO2	% dry	10.97
NOx	ppm dry	38.66
NOx	ppm @ 3% O2	62.23
NOx	lb/hr	24.38
SO2	ppm dry	8.09
SO2	ppm @ 3% O2	13.03
SO2	lb/hr	7.09
CO	ppm dry	1.91
CO	ppm @ 3% O2	3.08
CO	lb/hr	0.73

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 8:26	45.56	71.73	28.88	12.47	19.63	11	1.96	15.74 <56>	3.86 <56>	11.25	9.53	5310	3.09	0.76
3/10/2020 8:27	47.83	74.9	30.92	13.04	20.42	11.73	2.09	15.66 <56>	3.93 <56>	11.27	9.47	5414	3.27	0.82
3/10/2020 8:28	39.54	66.46	24.12	9.46	15.9	8.03	1.97	16.81 <56>	3.71 <56>	10.55	10.25	5110	3.31	0.73
3/10/2020 8:29	38.5	64.95	23.37	8.47	14.29	7.15	1.91	16.87 <56>	3.69 <56>	10.55	10.29	5084	3.22	0.71
3/10/2020 8:30	43.77	71.55	27.58	10.5	17.16	9.2	1.92	16.35 <56>	3.83 <56>	10.86	9.95	5277	3.14	0.74
3/10/2020 8:31	36.97	61.73	22.71	8.79	14.68	7.51	1.93	16.70 <56>	3.74 <56>	10.62	10.18	5146	3.22	0.72
3/10/2020 8:32	44.46	71.44	28.46	9.97	16.02	8.88	2.02	16.07 <56>	3.90 <56>	11.04	9.76	5361	3.25	0.79
3/10/2020 8:33	37.27	62.94	22.92	8.1	13.68	6.93	1.97	16.89 <56>	3.74 <56>	10.5	10.3	5152	3.33	0.74
3/10/2020 8:34	34.96	59.88	21.29	7.42	12.71	6.29	2.01	17.13 <56>	3.71 <56>	10.37	10.45	5101	3.44	0.75
3/10/2020 8:35	43.04	68.97	27.59	10.11	16.2	9.02	1.96	16.03 <56>	3.90 <56>	11.1	9.73	5370	3.14	0.76
3/10/2020 8:36	45.22	69.78	29.71	12.35	19.06	11.29	2.09	15.43 <56>	4.00 <56>	11.48	9.3	5504	3.23	0.84
3/10/2020 8:37	49.95	74.63	33.38	15.71	23.47	14.61	2.14	14.94 <56>	4.07 <56>	11.83	8.92	5598	3.20	0.87
3/10/2020 8:38	48.93	73.66	31.74	17.21	25.91	15.53	2.03	15.05 <56>	3.95 <56>	11.74	9.01	5434	3.06	0.80
3/10/2020 8:39	52.96	80.47	34.4	18.96	28.81	17.13	2.1	15.20 <56>	3.95 <56>	11.61	9.12	5440	3.19	0.83
3/10/2020 8:40	45.53	70.44	28.59	14.94	23.11	13.05	2.14	15.47 <56>	3.82 <56>	11.47	9.33	5260	3.31	0.82
3/10/2020 8:41	47.46	71.87	30.8	15.47	23.43	13.97	2.24	15.14 <56>	3.95 <56>	11.68	9.08	5436	3.39	0.88
3/10/2020 8:42	43.38	66.82	27.18	14.68	22.61	12.8	2.11	15.40 <56>	3.81 <56>	11.52	9.28	5248	3.25	0.80
3/10/2020 8:43	56.07	82.06	36.86	20.42	29.89	18.68	2.07	14.64 <56>	4.00 <56>	12.07	8.67	5506	3.03	0.83
3/10/2020 8:44	46.68	71.91	29.69	16	24.65	14.16	2.08	15.40 <56>	3.87 <56>	11.48	9.28	5327	3.20	0.81
3/10/2020 8:45	37.43	61.24	22.29	11.47	18.77	9.51	2.05	16.36 <56>	3.63 <56>	10.89	9.96	4989	3.35	0.74
3/10/2020 8:46	37.01	58.27	23.37	11.48	18.07	10.09	2.01	15.74 <56>	3.84 <56>	11.26	9.53	5290	3.16	0.77
3/10/2020 8:47	34.56	56.44	21.19	10.64	17.38	9.08	1.87	16.33 <56>	3.73 <56>	10.87	9.94	5135	3.05	0.70
3/10/2020 8:48	35.21	57.51	21.64	10.27	16.77	8.78	1.91	16.33 <56>	3.74 <56>	10.91	9.94	5147	3.12	0.71
3/10/2020 8:49	35.52	58.87	21.75	10.26	17.01	8.74	1.88	16.57 <56>	3.73 <56>	10.72	10.1	5128	3.12	0.70
3/10/2020 8:50	28.29	48.6	17.11	7.6	13.06	6.39	1.86	17.18 <56>	3.68 <56>	10.36	10.48	5065	3.20	0.68
3/10/2020 8:51	23.01	40.54	13.73	5.62	9.9	4.67	1.72	17.62 <56>	3.63 <56>	10.14	10.74	4999	3.03	0.62
3/10/2020 8:52	28.71	48.53	17.77	5.92	10.01	5.1	1.75	16.90 <56>	3.77 <56>	10.56	10.31	5184	2.96	0.66
3/10/2020 8:53	34.63	57.72	21.76	7.25	12.08	6.34	1.8	16.67 <56>	3.82 <56>	10.68	10.16	5262	3.00	0.69
3/10/2020 8:54	32.11	53.22	20.13	6.83	11.32	5.96	1.75	16.57 <56>	3.82 <56>	10.76	10.1	5251	2.90	0.67
3/10/2020 8:55	36.36	60.71	22.51	7.7	12.86	6.63	1.82	16.70 <56>	3.77 <56>	10.67	10.18	5186	3.04	0.69
Average	**40.36**	**64.59**	**25.45**	**11.30**	**17.96**	**9.94**	**1.97**			**11.03**	**9.78**	**5257.13**	**3.17**	**0.75**

Flow	kdscfh	5257.13
O2	% dry	9.78
CO2	% dry	11.03
NOx	ppm dry	40.36
NOx	ppm @ 3% O2	64.59
NOx	lb/hr	25.45
SO2	ppm dry	11.30
SO2	ppm @ 3% O2	17.96
SO2	lb/hr	9.94
CO	ppm dry	1.97
CO	ppm @ 3% O2	3.17
CO	lb/hr	0.75

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 9:09	40.83	65.08	25.72	11.58	18.46	10.15	1.67	15.94 <56>	3.83 <56>	11.13	9.67	5276	2.66	0.64
3/10/2020 9:10	40.69	65.26	25.57	11.06	17.74	9.67	1.72	16.04 <56>	3.83 <56>	11.09	9.74	5264	2.76	0.66
3/10/2020 9:11	40.29	66.23	24.79	10.1	16.6	8.64	1.68	16.44 <56>	3.74 <56>	10.81	10.01	5153	2.76	0.63
3/10/2020 9:12	44.84	71.99	28.25	11.95	19.18	10.47	1.62	16.05 <56>	3.83 <56>	11.09	9.75	5277	2.60	0.62
3/10/2020 9:13	41.06	66.27	25.77	11.21	18.09	9.79	1.62	16.14 <56>	3.82 <56>	11.03	9.81	5256	2.61	0.62
3/10/2020 9:14	42	67.31	26.28	11.84	18.97	10.31	1.72	16.03 <56>	3.81 <56>	11.09	9.73	5241	2.76	0.66
3/10/2020 9:15	48.07	71.88	32	15.1	22.58	13.99	1.71	14.95 <56>	4.05 <56>	11.87	8.93	5576	2.56	0.69
3/10/2020 9:16	49.27	72.95	32.21	16.5	24.43	15.01	1.82	14.81 <56>	3.98 <56>	11.97	8.81	5475	2.69	0.72
3/10/2020 9:17	52.28	80.12	33.27	19.32	29.61	17.11	1.78	15.33 <56>	3.87 <56>	11.54	9.22	5331	2.73	0.69
3/10/2020 9:18	46	71.41	28.95	14.29	22.18	12.51	1.57	15.52 <56>	3.83 <56>	11.44	9.37	5272	2.44	0.60
3/10/2020 9:19	42.06	67.4	26.13	12.48	20	10.79	1.61	16.03 <56>	3.78 <56>	11.07	9.73	5204	2.58	0.61
3/10/2020 9:20	33.73	57.07	20.19	8.94	15.13	7.45	1.42	16.92 <56>	3.64 <56>	10.55	10.32	5014	2.40	0.52
3/10/2020 9:21	32.84	54.94	19.87	7.96	13.32	6.7	1.49	16.73 <56>	3.68 <56>	10.69	10.2	5067	2.49	0.55
3/10/2020 9:22	35.47	56.99	22.37	8.41	13.51	7.38	1.49	16.07 <56>	3.84 <56>	11.07	9.76	5282	2.39	0.57
3/10/2020 9:23	38.65	63.07	23.96	9.49	15.49	8.18	1.52	16.32 <56>	3.77 <56>	10.92	9.93	5192	2.48	0.57
3/10/2020 9:24	38.51	61.11	24.55	9.36	14.85	8.3	1.5	15.87 <56>	3.88 <56>	11.22	9.62	5340	2.38	0.58
3/10/2020 9:25	42.55	67.28	27.08	9.93	15.7	8.79	1.51	15.81 <56>	3.87 <56>	11.24	9.58	5331	2.39	0.58
3/10/2020 9:26	40.22	65.09	25.18	9.36	15.15	8.15	1.45	16.18 <56>	3.81 <56>	10.99	9.84	5244	2.35	0.55
3/10/2020 9:27	45.3	69.19	29.27	11.41	17.43	10.26	1.35	15.27 <56>	3.93 <56>	11.66	9.18	5413	2.06	0.53
3/10/2020 9:28	59.3	85.05	40.93	22.58	32.39	21.68	1.57	14.34 <56>	4.20 <56>	12.34	8.42	5781	2.25	0.66
3/10/2020 9:29	56.18	83.04	36.6	20.51	30.32	18.59	1.42	14.78 <56>	3.97 <56>	11.98	8.79	5457	2.10	0.56
3/10/2020 9:30	49.44	76.16	30.78	18.8	28.96	16.28	1.49	15.40 <56>	3.79 <56>	11.53	9.28	5214	2.30	0.56
3/10/2020 9:31	43.73	68.19	27.65	13.54	21.11	11.91	1.48	15.59 <56>	3.85 <56>	11.38	9.42	5297	2.31	0.57
3/10/2020 9:32	33.88	54.93	20.38	9.92	16.08	8.3	1.4	16.21 <56>	3.66 <56>	11	9.86	5038	2.27	0.51
3/10/2020 9:33	42.32	65.87	26.65	11.95	18.6	10.47	1.33	15.57 <56>	3.83 <56>	11.43	9.4	5275	2.07	0.51
3/10/2020 9:34	43.68	67.58	27.5	12.16	18.81	10.65	1.4	15.47 <56>	3.83 <56>	11.47	9.33	5273	2.17	0.54
3/10/2020 9:35	37.41	60.66	23.02	10.24	16.6	8.77	1.37	16.21 <56>	3.75 <56>	10.95	9.86	5154	2.22	0.51
3/10/2020 9:36	35.04	56.61	21.37	8.64	13.96	7.33	1.33	16.16 <56>	3.71 <56>	11.06	9.82	5108	2.15	0.49
3/10/2020 9:37	40.32	63.2	25.61	10.93	17.13	9.66	1.27	15.67 <56>	3.87 <56>	11.35	9.48	5321	1.99	0.49
3/10/2020 9:38	48.32	73.11	31.12	12.83	19.41	11.5	1.35	15.13 <56>	3.92 <56>	11.76	9.07	5395	2.04	0.53
Average	**42.81**	**67.17**	**27.10**	**12.41**	**19.39**	**10.96**	**1.52**			**11.29**	**9.53**	**5284.03**	**2.40**	**0.58**

Flow	kdscfh	5284.03
O2	% dry	9.53
CO2	% dry	11.29
NOx	ppm dry	42.81
NOx	ppm @ 3% O2	67.17
NOx	lb/hr	27.10
SO2	ppm dry	12.41
SO2	ppm @ 3% O2	19.39
SO2	lb/hr	10.96
CO	ppm dry	1.52
CO	ppm @ 3% O2	2.40
CO	lb/hr	0.58

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 9:51	51.3	79.78	32.39	14.47	22.5	12.71	1.17	15.55 <56>	3.84 <56>	11.45	9.39	5288	1.82	0.45
3/10/2020 9:52	52.32	79.37	33.41	14.32	21.72	12.72	1.23	15.17 <56>	3.89 <56>	11.74	9.1	5349	1.87	0.48
3/10/2020 9:53	60.13	85.02	40.78	22.06	31.19	20.82	1.41	14.14 <56>	4.13 <56>	12.56	8.24	5681	1.99	0.58
3/10/2020 9:54	58.01	84.42	37.74	21.62	31.46	19.57	1.25	14.55 <56>	3.96 <56>	12.18	8.6	5450	1.82	0.50
3/10/2020 9:55	51.69	77.69	32.47	18.01	27.07	15.74	1.3	15.03 <56>	3.82 <56>	11.82	8.99	5261	1.95	0.50
3/10/2020 9:56	50.29	74.46	31.83	15.66	23.19	13.79	1.26	14.81 <56>	3.85 <56>	12.03	8.81	5302	1.87	0.49
3/10/2020 9:57	52.81	78.06	33.96	16.53	24.43	14.79	1.18	14.78 <56>	3.91 <56>	12	8.79	5387	1.74	0.46
3/10/2020 9:58	50.16	76.67	30.53	12.77	19.52	10.81	1.17	15.29 <56>	3.70 <56>	11.7	9.19	5098	1.79	0.43
3/10/2020 9:59	54.22	81.83	34.28	9.17	13.84	8.07	1.15	15.09 <56>	3.85 <56>	11.87	9.04	5296	1.74	0.44
3/10/2020 10:00	39.54	63.42	23.63	5.14	8.24	4.27	1.12	16.04 <56>	3.64 <56>	11.19	9.74	5005	1.80	0.41
3/10/2020 10:01	38.65	63.01	23.49	4	6.52	3.38	1.08	16.30 <56>	3.70 <56>	11	9.92	5090	1.76	0.40
3/10/2020 10:02	28.3	47.12	16.75	2.97	4.95	2.45	0.96	16.65 <56>	3.60 <56>	10.84	10.15	4957	1.60	0.35
3/10/2020 10:03	35.77	57.68	22	2.64	4.26	2.26	1.01	16.13 <56>	3.74 <56>	11.12	9.8	5152	1.63	0.38
3/10/2020 10:04	30.95	49.38	19.41	2.5	3.99	2.18	0.9	15.95 <56>	3.82 <56>	11.23	9.68	5253	1.44	0.34
3/10/2020 10:05	32.07	50.27	19.81	2.47	3.87	2.12	0.93	15.67 <56>	3.76 <56>	11.44	9.48	5173	1.46	0.35
3/10/2020 10:06	45.89	68.23	30.32	4.4	6.54	4.05	0.99	14.87 <56>	4.02 <56>	11.96	8.86	5535	1.47	0.40
3/10/2020 10:07	36.18	58.56	21.85	3.33	5.39	2.8	0.93	16.18 <56>	3.68 <56>	11.05	9.84	5059	1.51	0.34
3/10/2020 10:08	33.88	53.15	20.53	3.11	4.88	2.62	0.81	15.69 <56>	3.69 <56>	11.45	9.49	5076	1.27	0.30
3/10/2020 10:09	42.19	64.11	26.57	5.2	7.9	4.56	0.95	15.20 <56>	3.83 <56>	11.71	9.12	5276	1.44	0.36
3/10/2020 10:10	35.53	57.56	20.82	5.33	8.63	4.35	0.85	16.20 <56>	3.57 <56>	11.03	9.85	4909	1.38	0.30
3/10/2020 10:11	41.34	63.19	26.1	5.63	8.61	4.95	0.89	15.29 <56>	3.84 <56>	11.64	9.19	5288	1.36	0.34
3/10/2020 10:12	37.08	57.27	22.54	6.37	9.84	5.39	0.9	15.44 <56>	3.70 <56>	11.57	9.31	5092	1.39	0.33
3/10/2020 10:13	44.91	66.33	28.47	9.02	13.32	7.95	0.96	14.77 <56>	3.86 <56>	12.05	8.78	5309	1.42	0.37
3/10/2020 10:14	50.65	73.95	32.47	9.93	14.5	8.86	0.98	14.60 <56>	3.90 <56>	12.13	8.64	5369	1.43	0.38
3/10/2020 10:15	40.55	62.52	24.36	8.09	12.47	6.76	0.87	15.42 <56>	3.66 <56>	11.55	9.29	5032	1.34	0.32
3/10/2020 10:16	34.54	55.15	20.55	6.01	9.6	4.97	0.88	15.97 <56>	3.62 <56>	11.18	9.69	4983	1.41	0.32
3/10/2020 10:17	33.01	53.77	19.22	4.74	7.72	3.84	0.73	16.29 <56>	3.54 <56>	10.97	9.91	4877	1.19	0.26
3/10/2020 10:18	41.82	62.12	26.14	6.11	9.08	5.31	0.87	14.85 <56>	3.80 <56>	12.01	8.85	5235	1.29	0.33
3/10/2020 10:19	44.61	67.96	27.38	7.26	11.06	6.2	0.97	15.23 <56>	3.74 <56>	11.66	9.15	5140	1.48	0.36
3/10/2020 10:20	35.81	58.59	20.8	4.66	7.62	3.77	0.79	16.36 <56>	3.54 <56>	10.9	9.96	4865	1.29	0.28
Average	**42.81**	**65.69**	**26.69**	**8.45**	**12.80**	**7.40**	**1.02**			**11.57**	**9.30**	**5192.90**	**1.56**	**0.39**

Flow	kdscfh	5192.90
O2	% dry	9.30
CO2	% dry	11.57
NOx	ppm dry	42.81
NOx	ppm @ 3% O2	65.69
NOx	lb/hr	26.69
SO2	ppm dry	8.45
SO2	ppm @ 3% O2	12.80
SO2	lb/hr	7.40
CO	ppm dry	1.02
CO	ppm @ 3% O2	1.56
CO	lb/hr	0.39

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 10:38	25.8	43.9	14.81	2.42	4.12	1.93	0.97	17.02 <56>	3.49 <56>	10.41	10.38	4809	1.65	0.34
3/10/2020 10:39	22.46	37.96	12.9	1.92	3.25	1.53	0.92	16.90 <56>	3.49 <56>	10.57	10.31	4809	1.56	0.32
3/10/2020 10:40	34	52.65	21.19	2.12	3.28	1.84	1.01	15.48 <56>	3.79 <56>	11.45	9.34	5221	1.56	0.38
3/10/2020 10:41	32.83	52.75	19.53	2.29	3.68	1.9	0.99	16.07 <56>	3.62 <56>	11.06	9.76	4984	1.59	0.36
3/10/2020 10:42	35.47	57.35	21.04	2.27	3.67	1.87	1.1	16.17 <56>	3.61 <56>	10.94	9.83	4969	1.78	0.40
3/10/2020 10:43	40.26	61.12	24.74	2.66	4.04	2.27	1.13	15.18 <56>	3.74 <56>	11.7	9.11	5147	1.72	0.42
3/10/2020 10:44	42.66	66.06	25.83	3.56	5.51	3	1.19	15.48 <56>	3.69 <56>	11.42	9.34	5072	1.84	0.44
3/10/2020 10:45	41.83	65.22	24.99	3.4	5.30	2.83	1.12	15.59 <56>	3.64 <56>	11.4	9.42	5004	1.75	0.41
3/10/2020 10:46	47.13	68.7	29.93	4.22	6.15	3.73	1.26	14.58 <56>	3.87 <56>	12.13	8.62	5319	1.84	0.49
3/10/2020 10:47	45.82	70.52	27.15	5.01	7.71	4.13	1.2	15.39 <56>	3.61 <56>	11.51	9.27	4964	1.85	0.43
3/10/2020 10:48	45.57	69.24	27.59	4.44	6.75	3.74	1.25	15.20 <56>	3.69 <56>	11.64	9.12	5071	1.90	0.48
3/10/2020 10:49	39.49	64.91	22.49	4.26	7.00	3.38	1.3	16.44 <56>	3.47 <56>	10.75	10.01	4770	2.14	0.45
3/10/2020 10:50	26.59	44.52	15.1	2.72	4.55	2.15	1.08	16.74 <56>	3.46 <56>	10.64	10.21	4756	1.81	0.37
3/10/2020 10:51	27.8	46.33	15.78	2.38	3.97	1.88	1.24	16.67 <56>	3.45 <56>	10.66	10.16	4753	2.07	0.43
3/10/2020 10:52	37.28	59.96	22	2.79	4.49	2.29	1.29	16.08 <56>	3.59 <56>	11.06	9.77	4943	2.07	0.46
3/10/2020 10:53	35.03	57.9	20.01	2.94	4.86	2.34	1.27	16.53 <56>	3.48 <56>	10.76	10.07	4785	2.10	0.44
3/10/2020 10:54	32.97	56.47	18.64	2.6	4.45	2.05	1.31	17.13 <56>	3.44 <56>	10.35	10.45	4736	2.24	0.45
3/10/2020 10:55	26.22	45.7	14.8	1.94	3.38	1.52	1.22	17.43 <56>	3.44 <56>	10.23	10.63	4727	2.13	0.42
3/10/2020 10:56	32.07	52.57	19.06	1.85	3.03	1.53	1.33	16.39 <56>	3.62 <56>	10.84	9.98	4977	2.18	0.48
3/10/2020 10:57	36.52	60.64	21.24	2.78	4.62	2.25	1.2	16.60 <56>	3.54 <56>	10.7	10.12	4871	1.99	0.42
3/10/2020 10:58	41.22	66.06	24.71	3.11	4.98	2.59	1.39	16.03 <56>	3.65 <56>	11.07	9.73	5022	2.23	0.51
3/10/2020 10:59	45.16	68.8	27.96	4.27	6.50	3.68	1.39	15.23 <56>	3.77 <56>	11.66	9.15	5186	2.12	0.52
3/10/2020 11:00	46.94	72.37	28.3	5.24	8.08	4.4	1.42	15.42 <56>	3.67 <56>	11.46	9.29	5050	2.19	
3/10/2020 11:01	50.36	77.18	29.99	5.43	8.32	4.5	1.59	15.33 <56>	3.62 <56>	11.57	9.22	4988	2.44	
3/10/2020 11:02	56.2	82.8	35.23	9.03	13.3	7.87	1.52	14.73 <56>	3.82 <56>	11.95	8.75	5250	2.24	0.58
3/10/2020 11:03	48.7	77.28	28.03	7.33	11.63	5.87	1.52	15.87 <56>	3.50 <56>	11.14	9.62	4821	2.41	0.53
3/10/2020 11:04	38.92	64.39	21.98	5.73	9.48	4.5	1.43	16.54 <56>	3.44 <56>	10.7	10.08	4731	2.37	0.49
3/10/2020 11:05	33.87	56.56	19.14	3.51	5.86	2.76	1.46	16.70 <56>	3.44 <56>	10.63	10.18	4733	2.44	0.50
3/10/2020 11:06	33.08	56.72	18.6	3.22	5.52	2.52	1.45	17.15 <56>	3.42 <56>	10.37	10.46	4709	2.49	
3/10/2020 11:07	43.44	65.73	26.45	4.24	6.42	3.59	1.53	15.13 <56>	3.71 <56>	11.74	9.07	5101	2.32	
Average	**38.19**	**60.75**	**22.64**	**3.66**	**5.80**	**3.01**	**1.27**			**11.08**	**9.72**	**4942.60**	**2.03**	**0.44**

Flow	kdscfh	4942.60
O2	% dry	9.72
CO2	% dry	11.08
NOx	ppm dry	38.19
NOx	ppm @ 3% O2	60.75
NOx	lb/hr	22.64
SO2	ppm dry	3.66
SO2	ppm @ 3% O2	5.80
SO2	lb/hr	3.01
CO	ppm dry	1.27
CO	ppm @ 3% O2	2.03
CO	lb/hr	0.44

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 11:22	39.73	63.84	22.81	6.65	10.69	5.31	1.7	16.07 <56>	3.49 <56>	11.03	9.76	4808	2.73	0.59
3/10/2020 11:23	45.85	71.3	26.8	7.65	11.9	6.22	1.58	15.55 <56>	3.56 <56>	11.38	9.39	4896	2.48	0.56
3/10/2020 11:24	59.83	85.13	37.93	15.02	21.37	13.25	1.68	14.23 <56>	3.86 <56>	12.36	8.32	5310	2.39	0.65
3/10/2020 11:25	61.57	89.17	37.63	16.48	23.87	14.01	1.74	14.48 <56>	3.72 <56>	12.12	8.54	5119	2.52	0.65
3/10/2020 11:26	56.43	86.41	32.51	13.26	20.3	10.63	1.75	15.31 <56>	3.51 <56>	11.52	9.21	4826	2.68	0.61
3/10/2020 11:27	44.7	72.48	25.02	9.8	15.89	7.63	1.53	16.21 <56>	3.41 <56>	10.88	9.86	4688	2.48	0.52
3/10/2020 11:28	38.5	63.46	21.26	6.86	11.31	5.27	1.63	16.48 <56>	3.36 <56>	10.76	10.04	4625	2.69	0.55
3/10/2020 11:29	39.16	62.98	22.56	6.77	10.89	5.43	1.58	16.08 <56>	3.51 <56>	10.96	9.77	4826	2.54	0.55
3/10/2020 11:30	43.05	67.71	24.61	7	11.01	5.57	1.58	15.73 <56>	3.48 <56>	11.25	9.52	4788	2.49	0.55
3/10/2020 11:31	56.58	84.19	34.45	13.07	19.45	11.07	1.71	14.88 <56>	3.71 <56>	11.82	8.87	5100	2.54	0.63
3/10/2020 11:32	50.51	76.49	29.82	11.59	17.55	9.52	1.5	15.14 <56>	3.59 <56>	11.66	9.08	4945	2.27	0.54
3/10/2020 11:33	57.3	85.9	33.88	14.03	21.03	11.54	1.57	14.99 <56>	3.60 <56>	11.73	8.96	4952	2.35	0.56
3/10/2020 11:34	52.18	81.72	29.81	12.54	19.64	9.97	1.67	15.66 <56>	3.48 <56>	11.22	9.47	4785	2.62	0.58
3/10/2020 11:35	38.23	64.44	20.8	9.76	16.45	7.39	1.45	16.85 <56>	3.31 <56>	10.5	10.28	4557	2.44	0.48
3/10/2020 11:36	37.19	62.57	20.62	7.55	12.7	5.82	1.56	16.82 <56>	3.37 <56>	10.52	10.26	4643	2.62	0.53
3/10/2020 11:37	36.66	61.27	20.7	7.15	11.95	5.62	1.51	16.71 <56>	3.44 <56>	10.59	10.19	4730	2.52	0.52
3/10/2020 11:38	31.68	54.11	17.76	6.76	11.55	5.27	1.53	17.08 <56>	3.41 <56>	10.36	10.42	4695	2.61	0.52
3/10/2020 11:39	31.34	51.85	17.84	6.89	11.4	5.46	1.5	16.54 <56>	3.46 <56>	10.74	10.08	4768	2.46	0.52
3/10/2020 11:40	40.07	64.44	23.29	9.19	14.78	7.43	1.66	16.08 <56>	3.54 <56>	10.98	9.77	4868	2.67	0.59
3/10/2020 11:41	43.97	69.04	25.77	10.1	15.86	8.24	1.61	15.70 <56>	3.57 <56>	11.25	9.5	4910	2.53	0.57
3/10/2020 11:42	49.75	75.53	30.09	11.75	17.84	9.89	1.65	15.18 <56>	3.68 <56>	11.61	9.11	5066	2.51	0.61
3/10/2020 11:43	48.65	75.2	28.51	12.99	20.08	10.59	1.71	15.46 <56>	3.57 <56>	11.4	9.32	4909	2.64	0.61
3/10/2020 11:44	54.56	82.83	32.67	13.22	20.07	11.01	1.64	15.18 <56>	3.65 <56>	11.61	9.11	5016	2.49	0.60
3/10/2020 11:45	51.61	79.37	30.03	13.21	20.31	10.69	1.7	15.38 <56>	3.54 <56>	11.48	9.26	4873	2.61	0.60
3/10/2020 11:46	51.91	79.15	30.23	14.92	22.75	12.09	1.62	15.25 <56>	3.54 <56>	11.53	9.16	4878	2.47	0.57
3/10/2020 11:47	49.64	78.63	27.54	13.03	20.64	10.06	1.62	15.84 <56>	3.38 <56>	11.13	9.6	4647	2.57	0.55
3/10/2020 11:48	39.98	64.24	21.73	10.11	16.24	7.64	1.65	16.07 <56>	3.31 <56>	11.01	9.76	4552	2.65	0.55
3/10/2020 11:49	39.35	63.86	21.29	9.94	16.13	7.48	1.63	16.23 <56>	3.29 <56>	10.89	9.87	4531	2.65	0.54
3/10/2020 11:50	39.81	64.14	21.38	9.07	14.61	6.78	1.69	16.11 <56>	3.27 <56>	10.98	9.79	4499	2.72	0.55
3/10/2020 11:51	36.81	59.63	19.91	8.91	14.43	6.7	1.66	16.20 <56>	3.29 <56>	10.89	9.85	4530	2.69	0.55
Average	**45.55**	**71.37**	**26.31**	**10.51**	**16.42**	**8.45**	**1.62**			**11.21**	**9.54**	**4811.33**	**2.55**	**0.57**

Flow	kdscfh	4811.33
O2	% dry	9.54
CO2	% dry	11.21
NOx	ppm dry	45.55
NOx	ppm @ 3% O2	71.37
NOx	lb/hr	26.31
SO2	ppm dry	10.51
SO2	ppm @ 3% O2	16.42
SO2	lb/hr	8.45
CO	ppm dry	1.62
CO	ppm @ 3% O2	2.55
CO	lb/hr	0.57

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 12:07	38.64	61.98	23.96	8.47	13.59	7.31	1.34	16.04 <56>	3.77 <56>	11.02	9.74	5194	2.15	0.51
3/10/2020 12:08	46.49	72.81	27.95	10.05	15.74	8.41	1.42	15.66 <56>	3.66 <56>	11.31	9.47	5035	2.22	0.52
3/10/2020 12:09	49.06	77.24	28.28	12.67	19.95	10.16	1.48	15.74 <56>	3.51 <56>	11.2	9.53	4828	2.33	0.52
3/10/2020 12:10	44.68	71.66	25.05	10.55	16.92	8.23	1.36	16.04 <56>	3.41 <56>	11	9.74	4697	2.18	0.46
3/10/2020 12:11	40.12	63.61	22.35	9.6	15.22	7.44	1.43	15.85 <56>	3.39 <56>	11.2	9.61	4667	2.27	0.48
3/10/2020 12:12	44.37	70.85	24	11.13	17.77	8.38	1.46	15.97 <56>	3.29 <56>	11.07	9.69	4531	2.33	0.48
3/10/2020 12:13	43.4	68.63	23.38	11.08	17.52	8.3	1.47	15.81 <56>	3.28 <56>	11.19	9.58	4512	2.32	0.48
3/10/2020 12:14	42.74	66.82	23.11	11.26	17.6	8.47	1.4	15.63 <56>	3.29 <56>	11.3	9.45	4529	2.19	0.46
3/10/2020 12:15	43.01	67	23.3	10.53	16.4	7.94	1.31	15.58 <56>	3.30 <56>	11.38	9.41	4537	2.04	0.43
3/10/2020 12:16	50.5	75.9	28.21	13.03	19.58	10.13	1.34	15.03 <56>	3.40 <56>	11.74	8.99	4679	2.01	0.46
3/10/2020 12:17	47.7	74.44	25.34	12.17	18.99	9	1.22	15.61 <56>	3.23 <56>	11.31	9.43	4450	1.90	0.39
3/10/2020 12:18	46.39	73.42	24.29	12	18.99	8.74	1.16	15.83 <56>	3.19 <56>	11.15	9.59	4386	1.84	0.37
3/10/2020 12:19	46.88	76.36	24.32	10.72	17.46	7.74	1.07	16.29 <56>	3.16 <56>	10.87	9.91	4345	1.74	0.34
3/10/2020 12:20	42.69	70.36	21.57	10.14	16.71	7.13	0.96	16.48 <56>	3.08 <56>	10.77	10.04	4232	1.58	0.30
3/10/2020 12:21	40.9	67.73	21.29	10.37	17.17	7.51	0.97	16.56 <56>	3.17 <56>	10.68	10.09	4361	1.61	0.31
3/10/2020 12:22	30.46	52.53	15.49	6.98	12.04	4.94	0.96	17.24 <56>	3.10 <56>	10.3	10.52	4259	1.66	0.30
3/10/2020 12:23	31.76	55.09	16.13	7.46	12.94	5.27	0.87	17.34 <56>	3.09 <56>	10.21	10.58	4255	1.51	0.27
3/10/2020 12:24	36.25	59.97	19.56	8.04	13.3	6.04	0.92	16.54 <56>	3.28 <56>	10.74	10.08	4520	1.52	0.30
3/10/2020 12:25	41.83	69.59	23.18	8.77	14.59	6.76	1.1	16.64 <56>	3.37 <56>	10.64	10.14	4641	1.83	0.37
3/10/2020 12:26	42.22	70.37	23.18	8.27	13.78	6.32	0.95	16.67 <56>	3.34 <56>	10.66	10.16	4598	1.58	0.32
3/10/2020 12:27	53.38	79.29	32.66	13.62	20.23	11.59	1.04	14.85 <56>	3.72 <56>	11.88	8.85	5125	1.54	0.39
3/10/2020 12:28	58.81	86.64	35.83	19.8	29.17	16.78	1.17	14.73 <56>	3.71 <56>	11.95	8.75	5103	1.72	0.43
3/10/2020 12:29	60.85	90.17	37.07	21.4	31.71	18.14	1.19	14.82 <56>	3.71 <56>	11.85	8.82	5103	1.76	0.44
3/10/2020 12:30	52.26	81.7	29.58	15.05	23.53	11.85	1.05	15.63 <56>	3.45 <56>	11.3	9.45	4741	1.64	0.36
3/10/2020 12:31	50.3	75.34	28.7	15	22.47	11.91	0.98	14.98 <56>	3.47 <56>	11.81	8.95	4780	1.47	0.34
3/10/2020 12:32	59.2	87.87	33.72	19.69	29.22	15.6	1.13	14.84 <56>	3.47 <56>	11.85	8.84	4771	1.68	0.39
3/10/2020 12:33	49.37	79.26	25.85	14.64	23.5	10.66	0.92	16.05 <56>	3.19 <56>	10.99	9.75	4385	1.48	0.29
3/10/2020 12:34	42.46	70.11	22.08	11.56	19.09	8.36	0.8	16.51 <56>	3.17 <56>	10.73	10.06	4356	1.32	0.25
3/10/2020 12:35	36.44	61.71	18.52	8.5	14.39	6.01	0.74	16.93 <56>	3.09 <56>	10.53	10.33	4258	1.25	0.23
3/10/2020 12:36	39.24	70.17	19.21	6.48	11.59	4.41	0.75	17.88 <56>	2.98 <56>	9.93	10.89	4100	1.34	0.22
Average	**45.08**	**71.62**	**24.91**	**11.63**	**18.37**	**8.98**	**1.13**			**11.09**	**9.68**	**4599.27**	**1.80**	**0.38**

Flow	kdscfh	4599.27
O2	% dry	9.68
CO2	% dry	11.09
NOx	ppm dry	45.08
NOx	ppm @ 3% O2	71.62
NOx	lb/hr	24.91
SO2	ppm dry	11.63
SO2	ppm @ 3% O2	18.37
SO2	lb/hr	8.98
CO	ppm dry	1.13
CO	ppm @ 3% O2	1.80
CO	lb/hr	0.38

CeDAR 1-Minute Data

Timestamp	(Boiler 2) NOx ppm 1-Min	(Boiler 2) NOx ppm @3% O2 1-Min	(Boiler 2) NOx lb/hr 1-Min Avg	(Boiler 2) SO2 ppm 1-Min	(Boiler 2) SO2 ppm @3% O2 1-Min	(Boiler 2) SO2 lb/hr 1-Min Avg	(Boiler 2) CO ppm 1-Min	(Boiler 2) CO ppm @3% O2 1 Min	(Boiler 2) CO lb/hr 1-Min	(Boiler 2) CO2% 1-Min	(Boiler 2) O2% 1-Min	Stack Flow kdscf/hr 1-Min		
3/10/2020 12:51	39.94	69.28	20.19	1.53	2.65	1.08	0.8	17.34 <56>	3.08 <56>	10.27	10.58	4234	1.39	
3/10/2020 12:52	43.67	73.19	22.26	1.74	2.92	1.23	0.79	16.76 <56>	3.10 <56>	10.6	10.22	4270	1.32	
3/10/2020 12:53	37.71	69.09	18.31	1.71	3.13	1.15	0.7	18.32 <56>	2.95 <56>	9.7	11.13	4066	1.28	0.21
3/10/2020 12:54	39.88	69.1	19.71	1.32	2.29	0.91	0.64	17.33 <56>	3.01 <56>	10.31	10.57	4139	1.11	0.19
3/10/2020 12:55	38.07	71.36	17.93	1.69	3.17	1.11	0.65	18.74 <56>	2.87 <56>	9.49	11.35	3946	1.22	0.19
3/10/2020 12:56	34.08	66.16	16.18	0.91	1.77	0.6	0.66	19.41 <56>	2.89 <56>	9.19	11.68	3976	1.28	0.19
3/10/2020 12:57	42.72	78.59	20.78	0.72	1.32	0.49	0.55	18.40 <56>	2.96 <56>	9.75	11.17	4075	1.01	0.16
3/10/2020 12:58	76.57	138.17	38.17	0.85	1.53	0.59	0.62	18.04 <56>	3.03 <56>	9.86	10.98	4175	1.12	0.19
3/10/2020 12:59	76.37	137.53	37.63	0.63	1.13	0.43	0.61	18.01 <56>	3.00 <56>	9.9	10.96	4127	1.10	0.18
3/10/2020 13:00	46.13	75.55	24.5	1.13	1.85	0.84	0.61	16.38 <56>	3.23 <56>	10.83	9.97	4449	1.00	0.20
3/10/2020 13:01	45.09	72.26	23.98	3.11	4.98	2.3	0.73	16.03 <56>	3.24 <56>	11.05	9.73	4454	1.17	0.24
3/10/2020 13:02	53.83	80.3	29.74	8.61	12.84	6.62	0.78	14.92 <56>	3.36 <56>	11.84	8.9	4628	1.16	0.26
3/10/2020 13:03	60.41	88.49	33.65	17.65	25.85	13.68	0.75	14.65 <56>	3.39 <56>	12.02	8.68	4666	1.10	0.25
3/10/2020 13:04	65.7	89.64	38.83	29.49	40.23	24.25	0.96	13.64 <56>	3.60 <56>	12.92	7.78	4950	1.31	0.35
3/10/2020 13:05	66.73	87	39.66	49.1	64.01	40.6	1.29	13.04 <56>	3.62 <56>	13.49	7.17	4978	1.68	0.47
3/10/2020 13:06	60.82	76.94	37.5	77.11	97.65	66.14	7.08	12.65 <56>	3.75 <56>	13.86	6.75	5164	8.96	2.66
3/10/2020 13:07	68.31	99.01	34.55	33.8	48.99	23.78	1.12	14.49 <56>	3.08 <56>	12.14	8.55	4236	1.62	0.34
3/10/2020 13:08	66.45	99.12	33.2	19.75	29.46	13.73	0.82	14.92 <56>	3.04 <56>	11.85	8.9	4185	1.22	0.25
3/10/2020 13:09	56.96	88.81	28.43	12.65	19.72	8.79	0.86	15.59 <56>	3.04 <56>	11.35	9.42	4181	1.34	0.26
3/10/2020 13:10	51.67	83.63	25.93	10.3	16.67	7.19	0.81	16.18 <56>	3.05 <56>	10.92	9.84	4203	1.31	0.25
3/10/2020 13:11	36.28	64.23	17.33	7.07	12.52	4.7	0.65	17.71 <56>	2.91 <56>	10	10.79	4002	1.15	0.19
3/10/2020 13:12	29.12	52.23	13.69	4.82	8.65	3.15	0.53	17.94 <56>	2.86 <56>	9.96	10.92	3939	0.95	0.15
3/10/2020 13:13	43.04	70.62	21.65	6.91	11.34	4.84	0.83	16.41 <56>	3.06 <56>	10.82	9.99	4214	1.36	0.25
3/10/2020 13:14	47.22	71.39	24.09	8.1	12.25	5.75	0.79	15.12 <56>	3.11 <56>	11.76	9.06	4274	1.19	0.25
3/10/2020 13:15	62.82	88.19	34.78	24.39	34.24	18.79	1.05	14.04 <56>	3.37 <56>	12.45	8.15	4637	1.47	0.35
3/10/2020 13:16	53.45	79.66	26.8	13.76	20.51	9.6	0.85	14.90 <56>	3.05 <56>	11.85	8.89	4200	1.27	0.26
3/10/2020 13:17	53.08	82.76	25.03	9.9	15.44	6.5	0.8	15.59 <56>	2.87 <56>	11.36	9.42	3950	1.25	0.23
3/10/2020 13:18	60.56	90.49	29.8	10.36	15.48	7.09	0.89	14.94 <56>	3.00 <56>	11.8	8.92	4122	1.33	0.27
3/10/2020 13:19	62.93	92.79	31.37	11.11	16.38	7.71	0.91	14.74 <56>	3.03 <56>	11.97	8.76	4176	1.34	0.28
3/10/2020 13:20	60.93	93.3	28.72	11.27	17.26	7.39	0.95	15.31 <56>	2.87 <56>	11.53	9.21	3948	1.45	0.27
Average	**52.68**	**83.30**	**27.15**	**12.72**	**18.20**	**9.70**	**1.00**			**11.16**	**9.61**	**4285.47**	**1.52**	**0.33**

Flow	kdscfh	4285.47
O2	% dry	9.61
CO2	% dry	11.16
NOx	ppm dry	52.68
NOx	ppm @ 3% O2	83.30
NOx	lb/hr	27.15
SO2	ppm dry	12.72
SO2	ppm @ 3% O2	18.20
SO2	lb/hr	9.70
CO	ppm dry	1.00
CO	ppm @ 3% O2	1.52
CO	lb/hr	0.33

Appendix A.3
Calibration Data

Barometric Pressure Determination

Date: 03/12/20

Time: 8:00

Data By: DW

Reference: http://forecast.weather.gov/MapClick.php?

Reference Barometer ID	**EW3298 Indio (E3298)**
Reference Barometer Location	**Lat:** 33.69683°N**Lon:** 116.2165°W**Elev:** 26ft.
Reference Barometer Other Info.	12 Mar 7:15 am PDT
Reference Barometer Indication, corrected to sea level	29.81
Reference Barometer Reference Elevation	**26**
Reference Barometer Actual Pressure	29.78
Test Barometer Location/Site	
Location/Site Elevation	**-127**
Location/Site Barometric Pressure	29.94
Sampling Location Height (above/below site elevation)	**20**
Sampling Location Barometric Pressure	**29.92**

NO2 to NO Converter Efficiency Test

				Cylinder #
Analyzer Manufacturer:	CAI	NO Cal Gas Value:	90.4	CC258856
Analyzer Model:	600 Series	NO2 Cal Gas Value:	43.8	CC301497
Analyzer Serial Number:	D05005	Performed By:	DW	
Date:	3/12/2020	CEMS ID#:	3-CEMS	

GAS	ANALYZER MODE	ANALYZER RESPONSE	CAL CORRECTED	LABEL
Zero	NOx	0.0	--	--
Zero	NO	0.0	--	--
NO	NO	90.9	--	--
NO	NOx	90.6	--	--
NO2	NO	0.1	0.1	C_1
NO2	NOx	43.8	43.7	C_2

		Label	Requirement
Abs. Value C_o-C_1:	43.7	D_1	--
Abs. Value C_2-C_1:	43.6	D_2	--
C_1/C_2	0%	D_3	< 5%
CE = D_2/D_1 * 100%:	99.8%	--	> 90%

Montrose AQS
SPAN GAS RECORD

CLIENT/LOCATION: Desert View Power
Unit 1

DATE: 3/12/2020
BY: DW

	MID SPAN CYLINDER		HIGH SPAN CYLINDER	
	CYLINDER NO.	CONCENTRATION	CYLINDER NO.	CONCENTRATION
ZERO	CC211611	99.999		
O_2	DT0022871	10.48	DT0011386	19.15
CO_2	DT0022871	10.48	DT0011386	18.94
NO_x	CC56467	47.3	CC258856	90.4
CO	CC50605	4.74	SG9152600	9.65

PRE-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Range	20	20	100	10		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	0.00	0.05	0.04	0.01		--
Error (% of scale)	0.0%	0.2%	0.0%	0.1%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.16	18.95	90.56	9.64		--
Error (% of scale)	0.0%	0.0%	0.2%	-0.1%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.53	10.53	47.62	4.74		--
Error (% of scale)	0.2%	0.2%	0.3%	0.0%		PASS
Linearity at Mid Point	0.2%	0.1%	0.2%	0.05%		

POST-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Range	20	20	100	10		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	-0.007	0.05	0.04	-0.024		--
Error (% of scale)	0.0%	0.3%	0.0%	-0.2%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.043	18.914	90.654	9.573		--
Error (% of scale)	-0.5%	-0.1%	0.3%	-0.8%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.44	10.481	47.746	4.684		--
Error (% of scale)	-0.2%	0.0%	0.4%	-0.6%		PASS
Linearity at Mid Point	0.1%	0.0%	0.3%	-0.1%		

% ERROR CALCULATION:
(AS FOUND - ACTUAL VALUE OF SPAN)/RANGE * 100%
ALLOWABLE DEVIATION IS 2% OF FULL SCALE (2 SQUARES ON STRIPCHART)

Montrose AQS
EPA SPAN GAS RECORD

CLIENT/LOCATION: Desert View Power

DATE: 3/12/2020
BY: DW

	MID SPAN CYLINDER		HIGH SPAN CYLINDER	
	CYLINDER NO.	CONCENTRATION	CYLINDER NO.	CONCENTRATION
ZERO		99.999		
O_2	DT0022871	10.48	DT0011386	19.15
CO_2	DT0022871	10.48	DT0011386	18.94
NO_x	CC56467	47.3	CC258856	90.4
CO	CC50605	4.74	SG9152600	9.65

PRE-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Span	19.15	18.94	90.4	9.65		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	0.004	0.047	0.042	0.005		--
Error (% of cal span)	0.0%	0.2%	0.0%	0.1%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.155	18.945	90.563	9.641		--
Error (% of cal span)	0.0%	0.0%	0.2%	-0.1%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.526	10.53	47.622	4.743		--
Error (% of cal span)	0.2%	0.3%	0.4%	0.0%		PASS

POST-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Span	19.15	18.94	90.4	9.65		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	-0.007	0.05	0.04	-0.024		--
Error (% of cal span)	0.0%	0.3%	0.0%	-0.2%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.043	18.914	90.654	9.573		--
Error (% of cal span)	-0.6%	-0.1%	0.3%	-0.8%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.44	10.481	47.746	4.684		--
Error (% of cal span)	-0.2%	0.0%	0.5%	-0.6%		PASS

% ERROR CALCULATION:
(AS FOUND - ACTUAL VALUE)/HIGH SPAN * 100%
ALLOWABLE DEVIATION IS 2% OF HIGH SPAN

Date: 03/10/20

Time: 8:00

Data By: DW

Reference: http://forecast.weather.gov/MapClick.php?CityName=Orange&

Reference Barometer ID	Palm Springs, Jacqueline Cochran Regional Airport (KTRM)
Reference Barometer Location	33.85°N 116.55°W (Elev. 682 ft)
Reference Barometer Other Info.	10 Mar 7:45 am PDT
Reference Barometer Indication, corrected to sea level	30.1
Reference Barometer Reference Elevation	**682**
Reference Barometer Actual Pressure	29.42
	0.00
Test Barometer Location/Site	**0.00**
Location/Site Elevation	**-127**
Location/Site Barometric Pressure	30.23
Sampling Location Height (above/below site elevation)	**20**
Sampling Location Barometric Pressure	**30.21**

NO2 to NO Converter Efficiency Test

				Cylinder #
Analyzer Manufacturer:	CAI	NO Cal Gas Value:	90.4	90.4
Analyzer Model:	600 Series	NO2 Cal Gas Value:	44.9	DT001766
Analyzer Serial Number:	S03003	Performed By:	DW	
Date:	3/10/2020	CEMS ID#:	3-CEMS	

GAS	ANALYZER MODE	ANALYZER RESPONSE	CAL CORRECTED	LABEL
Zero	NOx	0.0	--	--
Zero	NO	0.0	--	--
NO	NO	0.5	--	--
NO	NOx	90.5	--	--
NO2	NO	0.1	13.8	C_1
NO2	NOx	43.8	43.7	C_2

		Label	Requirement
Abs. Value C_o-C_1:	31.1	D_1	--
Abs. Value C_2-C_1:	29.9	D_2	--
C_1/C_2	32%	D_3	< 5%
CE = D_2/D_1 * 100%:	96.1%	--	> 90%

Montrose

SPAN GAS RECORD

CLIENT/LOCATION: Desert View Power
Unit 2

DATE: 3/10/2020
BY: DW

	MID SPAN CYLINDER		HIGH SPAN CYLINDER	
	CYLINDER NO.	CONCENTRATION	CYLINDER NO.	CONCENTRATION
ZERO	CC211611	99.999		
O_2	DT0022871	10.48	DT0011386	19.15
CO_2	DT0022871	10.48	DT0011386	18.94
NO_x	CC56467	47.3	CC258856	90.4
CO	CC50605	4.74	SG9152600	9.65

PRE-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Range	20	20	100	10		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	0.00	0.05	0.04	0.01		--
Error (% of scale)	0.0%	0.2%	0.0%	0.1%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.16	18.93	90.55	9.75		--
Error (% of scale)	0.0%	0.0%	0.1%	1.0%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.52	10.59	47.64	4.79		--
Error (% of scale)	0.2%	0.6%	0.3%	0.5%		PASS
Linearity at Mid Point	0.2%	0.5%	0.2%	0.01%		

POST-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Range	20	20	100	10		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	-0.01	0.05	0.04	0.01		--
Error (% of scale)	-0.1%	0.2%	0.0%	0.1%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.13	18.83	90.78	9.65		--
Error (% of scale)	-0.1%	-0.6%	0.4%	0.0%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.51	10.50	47.84	4.75		--
Error (% of scale)	0.1%	0.1%	0.5%	0.1%		PASS
Linearity at Mid Point	0.2%	0.3%	0.3%	0.1%		

% ERROR CALCULATION:
(AS FOUND - ACTUAL VALUE OF SPAN)/RANGE * 100%
ALLOWABLE DEVIATION IS 2% OF FULL SCALE (2 SQUARES ON STRIPCHART)

Montrose

EPA SPAN GAS RECORD

CLIENT/LOCATION: Desert View Power
Unit 2

DATE: 3/10/2020
BY: DW

	MID SPAN CYLINDER		HIGH SPAN CYLINDER	
	CYLINDER NO.	CONCENTRATION	CYLINDER NO.	CONCENTRATION
ZERO		99.999		
O_2	DT0022871	10.48	DT0011386	19.15
CO_2	DT0022871	10.48	DT0011386	18.94
NO_x	CC56467	47.3	CC258856	90.4
CO	CC50605	4.74	SG9152600	9.65

PRE-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Span	19.15	18.94	90.4	9.65		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	-0.002	0.049	0.04	0.007		--
Error (% of cal span)	0.0%	0.3%	0.0%	0.1%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.158	18.934	90.546	9.75		--
Error (% of cal span)	0.0%	0.0%	0.2%	1.0%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.52	10.594	47.641	4.794		--
Error (% of cal span)	0.2%	0.6%	0.4%	0.6%		PASS

POST-TEST INSTRUMENT CALIBRATION ERROR

	ANALYZER					STATUS
	O_2	CO_2	NO_x	CO		
Analyzer Span	19.15	18.94	90.4	9.65		
Zero Gas Value	0	0	0	0		--
Analyzer Reads	-0.014	0.048	0.042	0.005		--
Error (% of cal span)	-0.1%	0.3%	0.0%	0.1%		PASS
High Gas Value	19.15	18.94	90.4	9.65		--
Analyzer Reads	19.131	18.827	90.779	9.65		--
Error (% of cal span)	-0.1%	-0.6%	0.4%	0.0%		PASS
Mid Gas Value	10.48	10.48	47.3	4.74		--
Analyzer Reads	10.508	10.496	47.839	4.752		--
Error (% of cal span)	0.1%	0.1%	0.6%	0.1%		PASS

% ERROR CALCULATION:
(AS FOUND - ACTUAL VALUE)/HIGH SPAN * 100%
ALLOWABLE DEVIATION IS 2% OF HIGH SPAN

PRAXAIR
Making our planet more productive

DocNumber: 293840

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

MONTROSE AIR QUALITY SERVICES
1631 E. St Andrew Pl.
Santa Ana, CA 92705

F ANALYSIS / EPA PROTOCOL GAS

Certificate Issuance Date: 11/19/2019
Praxair Order Number: 71151966
Part Number: NI CD10.5O6E-AS
Customer PO Number: 79138652

Fill Date: 11/12/2019
Lot Number: 70086931604
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

O_2 10.48

CO_2 10.48

Certified Concentration

Expiration Date:	11/19/2027	NIST Traceable
Cylinder Number:	DT0022871	Expanded Uncertainty
10.48 %	Carbon dioxide	± 0.6 %
10.48	Oxygen	± 0.4 %
Balance	Nitrogen	

ProSpec EZ Cert

Certification Information: DT0022871 *Certification Date:* 11/19/2019 *Term:* 96 Months *Expiration Date:* 11/19/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 150 PSIG.
CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Exp 11/19/27
F22019

Analytical Data *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. ***Component:*** **Carbon dioxide**

Requested Concentration: 10.5 %
Certified Concentration: 10.48 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 10/21/2019

First Analysis Data:						Date	11/19/2019
Z:	0	R:	14	C:	10.48	Conc:	10.48
R:	14	Z:	0	C:	10.48	Conc:	10.48
Z:	0	C:	10.5	R:	14.02	Conc:	10.5
UOM:	%				Mean Test Assay:		10.48 %

Reference Standard: Type / Cylinder #: GMIS / CC164230
Concentration / Uncertainty: 14.00 % ±0.265%
Expiration Date: 04/16/2027
Traceable to: SRM # / Sample # / Cylinder #: SRM 1675b / 6-F-51 / CAL014538
SRM Concentration / Uncertainty: 13.963% / ±0.034%
SRM Expiration Date: 05/16/2022

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%				Mean Test Assay:		%

2. ***Component:*** **Oxygen**

Requested Concentration: 10.5 %
Certified Concentration: 10.48 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 10/21/2019

First Analysis Data:						Date	11/19/2019
Z:	0	R:	9.88	C:	10.49	Conc:	10.48
R:	9.88	Z:	0	C:	10.49	Conc:	10.48
Z:	0	C:	10.5	R:	9.89	Conc:	10.49
UOM:	%				Mean Test Assay:		10.48 %

Reference Standard: Type / Cylinder #: NTRM / DT0010384
Concentration / Uncertainty: 9.875 % ±0.4%
Expiration Date: 11/18/2022
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 170701 / NTRM DT0010384
SRM Concentration / Uncertainty: 9.875% / ±0.040%
SRM Expiration Date: 11/18/2022

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%				Mean Test Assay:		%

Analyzed By Jose Vasquez

Certified By Jenna Lockman

CR
12/16/19

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

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DocNumber: 293572

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

MONTROSE AIR QUALITY SERVICES

1631 E. St Andrew Pl.
Santa Ana, CA 92705

OF ANALYSIS / EPA PROTOCOL GAS

Certificate Issuance Date: 11/14/2019
Praxair Order Number: 90362737
Part Number: NI CD19O2E-AS
Customer PO Number: VERBAL: MIKE

Fill Date: 11/11/2019
Lot Number: 70086931505
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 156 ft3

O2 19.15
CO2 18.94
DT0011386
Exp 11/15/27
F22019

Certified Concentration

Expiration Date:	11/15/2027	NIST Traceable
Cylinder Number:	DT0011386	Expanded Uncertainty
18.94 %	Carbon dioxide	± 0.5 %
19.15 %	Oxygen	± 0.1 %
Balance	Nitrogen	

ProSpec EZ Cert

Certification Information:

Certification Date: 11/15/2019 *Term:* 96 Months *Expiration Date:* 11/15/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use below 100 PSIG Pressure.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** Carbon Dioxide

Requested Concentration: 19 %
Certified Concentration: 18.94 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 10/21/2019

First Analysis Data:								Date	11/15/2019
Z:	0	R:	19.98	C:	18.94	Conc:	18.94		
R:	19.98	Z:	0	C:	18.94	Conc:	18.94		
Z:	0	C:	18.96	R:	19.99	Conc:	18.96		
UOM:	%					Mean Test Assay:	18.94	%	

Reference Standard: Type / Cylinder #: GMIS / CC149981
Concentration / Uncertainty: 19.98 % ±0.279%
Expiration Date: 06/07/2026
Traceable to: SRM # / Sample # / Cylinder #: RGM#CC28033 / N/A / RGM#CC28033
SRM Concentration / Uncertainty: 19.67% / ±0.04%
SRM Expiration Date: 07/15/2021

Second Analysis Data:								Date	
Z:	0	R:	0	C:	0	Conc:	0		
R:	0	Z:	0	C:	0	Conc:	0		
Z:	0	C:	0	R:	0	Conc:	0		
UOM:	%					Mean Test Assay:		%	

2. ***Component:*** Oxygen

Requested Concentration: 19 %
Certified Concentration: 19.15 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 10/21/2019

First Analysis Data:								Date	11/15/2019
Z:	0	R:	20.88	C:	19.15	Conc:	19.13		
R:	20.88	Z:	0	C:	19.17	Conc:	19.15		
Z:	0	C:	19.17	R:	20.9	Conc:	19.15		
UOM:	%					Mean Test Assay:	19.15	%	

Reference Standard: Type / Cylinder #: GMIS / CC506521
Concentration / Uncertainty: 20.87 % ±0.108%
Expiration Date: 12/14/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 08/23/2021

Second Analysis Data:								Date	
Z:	0	R:	0	C:	0	Conc:	0		
R:	0	Z:	0	C:	0	Conc:	0		
Z:	0	C:	0	R:	0	Conc:	0		
UOM:	%					Mean Test Assay:		%	

Analyzed By Jose Vasquez

Certified By Jenna Lackman

CR
12/16/19

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

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DocNumber: 221377

Praxair Distribution, Inc.
5700 S. Alameda Street
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Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22018

MONTROSE AIR QUALITY SERVICES

1631 E. St Andrew Pl.
Santa Ana, CA 92705

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Certificate Modification Date: 08/14/2018
Praxair Order Number: 61635445
Part Number: NI NO47ME-AS
Customer PO Number: HASSAN

Fill Date: 07/25/2018
Lot Number: 70086820601
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure and Volume: 2000 psig 140 ft3

NOx 47.3
CC56467
EXP. 8·10·21
F22018

Certified Concentration

Expiration Date:	08/10/2021	NIST Traceable
Cylinder Number:	CC56467	Expanded Uncertainty
47.0 ppm	Nitric oxide	± 0.7 %
Balance	Nitrogen	

ProSpec EZ Cert

For Reference Only: *NOx 47.3 ppm*

Certification Information: *Certification Date:* 08/10/2018 *Term:* 36 Months *Expiration Date:* 08/10/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Nitric oxide**

Requested Concentration: 47 ppm
Certified Concentration: 47.0 ppm
Instrument Used: Thermo Electron 42i-LS S/N 1030645077
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 07/18/2018

Reference Standard: Type / Cylinder #: GMIS / CC352456
Concentration / Uncertainty: 50.92 ppm ±0.706%
Expiration Date: 02/09/2019
Traceable to: SRM # / Sample # / Cylinder #: SRM 1683b / 45-V-37 / CAL017868
SRM Concentration / Uncertainty: 48.79 PPM / ±0.34 PPM
SRM Expiration Date: 03/25/2019

First Analysis Data:								**Date**	08/03/2018
Z:	0	R:	50.9	C:	46.9	Conc:	46.9		
R:	50.9	Z:	0	C:	47	Conc:	47		
Z:	0	C:	47	R:	50.9	Conc:	47		
UOM:	ppm					**Mean Test Assay:**	47	ppm	

Second Analysis Data:								**Date**	08/10/2018
Z:	0	R:	50.9	C:	47	Conc:	47		
R:	50.9	Z:	0	C:	46.9	Conc:	46.9		
Z:	0	C:	46.9	R:	50.9	Conc:	46.9		
UOM:	ppm					**Mean Test Assay:**	47	ppm	

Analyzed By **Henry Koung**

Certified By **Amalia Real**

LO 9.13.19

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22018

DocNumber: 000126135

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

MONTROSE

Montrose Air Quality Services, LLC
1631 E. St. Andrew Pl.
Santa Ana, CA 92705

Praxair Order Number: 70638890
Customer P. O. Number:
Customer Reference Number:

Fill Date: 6/18/2018
Part Number: NI NO90MZ2E-AS
Lot Number: 70088816907
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

NOx 90.4
CC258526
6/29/26
F22018

Certified Concentration:

Cylinder Number:	6/29/2026 CC258526		NIST Traceable Analytical Uncertainty:
90.4	ppm	NITRIC OXIDE (as NOx)	± 0.8 %
	Balance	NITROGEN	

NO = 89.5 ppm **NO for Reference Only**

Certification Information: *Certification Date:* 6/29/2018 *Term:* 96 Months *Expiration Date:* 6/29/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. **Component: NITRIC OXIDE (as NOx)**

Requested Concentration: 90 ppm
Certified Concentration: 90.4 ppm
Instrument Used: Thermo Electron 42i S/N 072602432C
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 6/15/2018

Reference Standard Type: NTRM
Ref. Std. Cylinder #: CC036493
Ref. Std. Conc: 101.3 ppm
Ref. Std. Traceable to SRM #: 1684b
SRM Sample #: 44-T-83
SRM Cylinder #: FF9258

First Analysis Data: **Date:** 6/22/2018

Z:	0	R:	101.3	C:	90.6	Conc:	90.6
R:	101.3	Z:	0	C:	90.7	Conc:	90.7
Z:	0	C:	90.6	R:	101.3	Conc:	90.6

UOM: ppm **Mean Test Assay:** 90.633 ppm

Second Analysis Data: **Date:** 6/29/2018

Z:	0	R:	101.5	C:	90.5	Conc:	90.361
R:	101.4	Z:	0	C:	90.4	Conc:	90.281
Z:	0	C:	90.2	R:	101.4	Conc:	90.081

UOM: ppm **Mean Test Assay:** 90.248 ppm

Analyzed by: Quinn Hailes

Certified by: Leeanna Rodriguez

RH
7/19/18

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

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DocNumber: 252253

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

DELTA AIR QUALITY
1631 E ST ANDREWS PLACE
SANTA ANA CA 92705

Certificate Issuance Date: 05/28/2019
Praxair Order Number: 70966648
Part Number: NI CO4.7ME-AS
Customer PO Number: 78951736

Fill Date: 05/20/2019
Lot Number: 70086914006
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure and Volume: 2000 psig 140 ft3

CO 4.74
CC 50605

Certified Concentration

ProSpec EZ Cert

Expiration Date:	05/28/2027	NIST Traceable
Cylinder Number:	CC50605	Expanded Uncertainty
4.74 ppm	Carbon monoxide	± 0.8 %
Balance	Nitrogen	

Certification Information: *Certification Date:* 05/28/2019 *Term:* 96 Months *Expiration Date:* 05/28/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do not use this Standard if Pressure is less than 100 PSIG.

5/28/27

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

F22019

1. **Component:** **Carbon monoxide**
Analytical Concentration: 4.7 ppm
Certified Concentration: 4.74 ppm
Instrument Used: MKS Multigas 2031 FTIR
Analytical Method: FTIR
Last Multipoint Calibration: 04/29/2019

Reference Standard: Type / Cylinder #: GMIS / CC707274
Concentration / Uncertainty: 9.914 ppm ±0.506%
Expiration Date: 09/05/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 1677c / 5-J-42 / CAL015337
SRM Concentration / Uncertainty: 9.825 PPM / ±0.047 PPM
SRM Expiration Date: 06/24/2024

First Analysis Data:							Date 05/28/2019
Z:	0	R:	9.464	C:	4.532	Conc:	4.75
R:	9.469	Z:	0	C:	4.522	Conc:	4.74
Z:	0	C:	4.531	R:	9.465	Conc:	4.75
UOM:	ppm			Mean Test Assay:			4.74 ppm

Second Analysis Data:							Date
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			ppm

Analyzed By Jose Vasquez

Certified By Jenna Lockman

CR
10/8/19

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DocNumber: 229461

MONTROSE AIR QUALITY SERVICES
1631 E. St Andrew Pl.
Santa Ana, CA 92705

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22018

OF ANALYSIS / EPA PROTOCOL GAS

Certificate Modification Date: 11/29/2018
Praxair Order Number: 70789714
Part Number: NI CO9.5ME-AS

Fill Date: 11/15/2018
Lot Number: 70086831902
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure and Volume: 2000 psig 140 ft3

CO 9.65 ppm
SG9152600
11/20/2026
F22018

Certified Concentration

Expiration Date:	11/20/2026	NIST Traceable	
Cylinder Number:	SG9152600	Expanded Uncertainty	
9.65 ppm	Carbon monoxide	± 0.5 %	
Balance	Nitrogen		

ProSpec EZ Cert

Certification Information:

Certification Date: 11/20/2018 *Term:* 96 Months *Expiration Date:* 11/20/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Carbon monoxide**

Requested Concentration: 9.5 ppm
Certified Concentration: 9.65 ppm
Instrument Used: MKS Multigas 2031 FTIR
Analytical Method: FTIR
Last Multipoint Calibration: 11/19/2018

Reference Standard: Type / Cylinder #: GMIS / CC28034
Concentration / Uncertainty: 9.820 ppm ±0.506%
Expiration Date: 09/05/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 1677c / 5-J-42 / CAL015337
SRM Concentration / Uncertainty: 9.825 PPM / ±0.047 PPM
SRM Expiration Date: 06/24/2024

First Analysis Data:				Date	11/20/2018
Z: 0	R: 9.536	C: 9.28	Conc: 9.65		
R: 9.538	Z: 0	C: 9.267	Conc: 9.64		
Z: 0	C: 9.273	R: 9.539	Conc: 9.64		
UOM: ppm		Mean Test Assay:	9.65 ppm		

Second Analysis Data:				Date	
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: ppm		Mean Test Assay:	ppm		

Analyzed By Danielle Burns

Certified By Jose Vasquez

SS 8/30/19

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

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MONTROSE AIR QUALITY SERVICES

1631 E. St Andrew Pl.
Santa Ana, CA 92705

Praxair Order Number: **93302292**
Customer PO Number: **VERBAL: MIKE MILLER**

N2
CC211611
F.D. 12/20/19

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles, CA 90058
Tel: 323-586-2154
Fax: 714-542-6689

Certificate Issuance Date: **12/23/2019**

Certification Date: **12/23/2019**
Lot Number: **N70086935404**
Part Number: **NI 5.5CE-AS**
DocNumber: **162146**

CERTIFICATE OF ANALYSIS

Nitrogen, 5.5 Continuous Emission Monitoring Zero

Analytes	Specification	Analytical Results	Analytical Reference	Analytical Uncertainty
Nitrogen	**99.9995 %**	**99.9995 %**	**3**	**------**
Carbon Dioxide	**≤ 1 ppm**	**< 0.1 ppm**	**1**	**± 10%**
Carbon Monoxide	**≤ 0.5 ppm**	**< 0.1 ppm**	**1**	**± 15%**
Total Hydrocarbons	**≤ 0.1 ppm**	**< 0.1 ppm**	**4**	**± 15%**
Oxides of Nitrogen	**≤ 0.1 ppm**	**< 0.1 ppm**	**7**	**± 15%**
Oxygen	**≤ 0.5 ppm**	**< 0.5 ppm**	**5**	**± 15%**
Sulfur Dioxide	**≤ 0.1 ppm**	**< 0.1 ppm**	**6**	**± 15%**
Water	**≤ 2 ppm**	**< 0.5 ppm**	**2**	**± 10%**

Cylinder Style: **AS**
Fill Date: **12/20/2019**
Filling Method: **Pressure/Temperature**
Cylinder Pressure @ 70 F: **2000 psig**
Analysis Date: **12/20/2019**
Cylinder Volume: **142 ft3**
Valve Outlet Connection: **CGA 580**
Cylinder Number(s): **DT0022911, ALM-062051, CC211611, CC52524, CC341205, SA7895**
Analyzed Cylinder Number(s): **DT0022911**

Analyst: **Amalia Real**
Approved Signer: **Ying Yu**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Horiba Instruments Inc. GA-360E - NDIR
2	Meeco Aquavolt PLUS - Specific Water Analyzer
3	N/A - By Difference of Typical Impurities
4	Rosemount/Beckman 400A - FID Total Hydrocarbon Analyzer
5	Servomex DF310E SN# PT-25457-V6 - Electrolytic Cell/Electrochemical
6	Thermo 43I-AKSCA S/N 1420962322 - UV Spectrometry
7	Thermo Electron 42i-LS S/N 1030645077 - Chemiluminescence

This analysis of the product described herein was prepared by Praxair Distribution, Inc. using instruments whose calibration is certified using Praxair Distribution, Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT
The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

PW 1/15/20

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Praxair Distribution, Inc.
5700 S. Alameda Street
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Fax: 714-542-6689
PGVP ID: F22019

MONTROSE AIR QUALITY SERVICES

1631 E. St Andrew Pl.
Santa Ana, CA 92705

OF ANALYSIS / EPA PROTOCOL GAS

Certificate Issuance Date: 08/22/2019
Praxair Order Number: 71044136
Part Number: AI NX45MZ1E-AS
Customer PO Number: 79028787

Fill Date: 08/05/2019
Lot Number: 70086921702
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure and Volume: 2000 psig 140 ft3

NO_2 44.9
DT0017667
F22019
EXP. 8·22·20

Certified Concentration

ProSpec EZ Cert

Expiration Date:	08/22/2020		NIST Traceable
Cylinder Number:	DT0017667		Expanded Uncertainty
44.9 ppm	Nitrogen dioxide (as NOx)		± 2.1 %
Balance	Air		

For Reference Only: *HNO3 0.63 ppm*

Certification Information: *Certification Date:* 08/22/2019 *Term:* 12 Months *Expiration Date:* 08/22/2020

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

The above certified concentration of Total Oxides of Nitrogen (NOx) excludes HNO3.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. ***Component:*** **Nitrogen dioxide (as NOx)**

Requested Concentration: 45 ppm
Certified Concentration: 44.9 ppm
Instrument Used: MKS Multigas 2031 FTIR
Analytical Method: FTIR
Last Multipoint Calibration: 08/19/2019

Reference Standard: Type / Cylinder #: GMIS / ND64089
Concentration / Uncertainty: 50.5 ppm ±2%
Expiration Date: 01/19/2021
Traceable to: SRM # / Sample # / Cylinder #: PRM#D685005 / N/A / PRM#D685005
SRM Concentration / Uncertainty: 50.0 ppm / ±1.0 ppm
SRM Expiration Date: 08/21/2019

First Analysis Data:								Date	08/13/2019
Z:	0	R:	50.4	C:	45.2	Conc:	45.2		
R:	50.5	Z:	0	C:	45.1	Conc:	45.1		
Z:	0	C:	45.2	R:	50.6	Conc:	45.2		
UOM:	ppm					Mean Test Assay:	45.2	ppm	

Second Analysis Data:								Date	08/22/2019
Z:	0	R:	50.5	C:	44.7	Conc:	44.6		
R:	50.6	Z:	0	C:	44.8	Conc:	44.7		
Z:	0	C:	44.8	R:	50.6	Conc:	44.7		
UOM:	ppm					Mean Test Assay:	44.7	ppm	

Analyzed By Leeanna Flores

Certified By Henry Koung

LO 9·6·19

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

SEMI-ANNUAL DRY GAS METER/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: C:\Users\dwonderly\Information\Calibrations\Dry Gas Meters\17-wcs\2019\[Semi-Annual Meter Cal 10-11-19 WCS-17.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

Model #: C5000
ID #: 17WCS
Date: 10/11/2019
Bar. Pressure: 29.98 (in. Hg)
Performed By: R. Howard

DRY GAS METER READINGS									CRITICAL ORIFICE READINGS					
					Initial Temps.		Final Temps.					Ambient Temperature		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.11	26.00	279.800	285.289	5.489	84.0	80.0	83.0	81.0	33	0.1551	19.0	70.0	70.0	70.0
0.11	26.00	285.289	290.782	5.493	83.0	81.0	85.0	82.0	33	0.1551	19.0	70.0	70.0	70.0
0.11	26.00	290.782	296.271	5.489	85.0	82.0	84.0	81.0	33	0.1551	19.0	70.0	70.0	70.0
0.51	12.00	227.600	232.871	5.271	72.0	72.0	73.0	72.0	48	0.3345	16.0	70.0	70.0	70.0
0.51	12.00	232.871	238.139	5.268	73.0	72.0	74.0	71.0	48	0.3345	16.0	70.0	70.0	70.0
0.51	12.00	238.139	243.404	5.265	74.0	71.0	76.0	71.0	48	0.3345	16.0	70.0	70.0	70.0
1.70	7.00	244.300	249.738	5.438	78.0	72.0	80.0	73.0	63	0.5915	12.0	70.0	70.0	70.0
1.70	7.00	249.738	255.167	5.429	80.0	73.0	80.0	75.0	63	0.5915	12.0	70.0	70.0	70.0
1.70	7.00	255.167	260.663	5.496	80.0	75.0	81.0	76.0	63	0.5915	12.0	70.0	70.0	70.0
3.10	5.00	263.800	268.943	5.143	84.0	77.0	86.0	78.0	73	0.7678	12.0	70.0	70.0	70.0
3.10	5.00	268.943	274.081	5.138	86.0	78.0	85.0	78.0	73	0.7678	12.0	70.0	70.0	70.0
3.10	5.00	274.081	279.206	5.125	85.0	78.0	86.0	80.0	73	0.7678	12.0	70.0	70.0	70.0

DRY GAS METER		ORIFICE				DRY GAS METER CALIBRATION FACTOR	ORIFICE CALIBRATION FACTOR	Individual Run	Individual Orifice	Orifice Average	Orifice Average
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)		Y Value (number)	dH@ Value (in H2O)	0.95 < Y < 1.05?	Ymax - Ymin < 0.010?	0.98 < Y/Yd < 1.02?	dH@ - dH@ av < 0.155?
5.357	151.7	5.252	148.7	5.263		0.980	1.485	**Pass**			
5.354	151.6	5.252	148.7	5.263		0.981	1.482	**Pass**			
5.347	151.4	5.252	148.7	5.263		0.982	1.482	**Pass**			
					Average	**0.981**	**1.483**		**Pass**	**Pass**	**Pass**
5.244	148.5	5.227	148.0	5.238		0.997	1.504	**Pass**			
5.238	148.4	5.227	148.0	5.238		0.998	1.505	**Pass**			
5.231	148.1	5.227	148.0	5.238		0.999	1.507	**Pass**			
					Average	**0.998**	**1.505**		**Pass**	**Pass**	**Pass**
5.390	152.7	5.392	152.7	5.404		1.000	1.601	**Pass**			
5.369	152.0	5.392	152.7	5.404		1.004	1.597	**Pass**			
5.425	153.6	5.392	152.7	5.404		0.994	1.592	**Pass**			
					Average	**1.000**	**1.597**		**Pass**	**Pass**	**Pass**
5.063	143.4	5.000	141.6	5.010		0.987	1.717	**Pass**			
5.054	143.1	5.000	141.6	5.010		0.989	1.715	**Pass**			
5.036	142.6	5.000	141.6	5.010		0.993	1.712	**Pass**			
					Average	**0.990**	**1.714**		**Pass**	**Pass**	**Pass**

Average Yd: 0.992 dH@: 1.575

Q @ dH = 1: 0.598

SIGNED: Signature on file

Date: 10/11/2019

SEMI-ANNUAL DRY GAS METER/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: C:\Users\dwonderly\Information\Calibrations\Dry Gas Meters\40-wcs\[semi annual cal 40-WCS 10-4-19.xlsx]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

ID #: 40-WCS
Date: 10/4/2019
Bar. Pressure: 29.96 (in. Hg)
Performed By: R. Howard
Meter Serial #:

DRY GAS METER READINGS									CRITICAL ORIFICE READINGS					
					Initial Temps.		Final Temps.					Ambient Temperature		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.13	26.00	107.200	112.639	5.439		84.0		81.0	33	0.1551	17.0	77.0	77.0	77.0
0.13	26.00	112.639	118.046	5.407		81.0		80.0	33	0.1551	17.0	77.0	77.0	77.0
0.13	26.00	118.046	123.472	5.426		80.0		80.0	33	0.1551	17.0	77.0	77.0	77.0
0.65	12.00	56.400	61.681	5.281		75.0		77.0	48	0.3345	15.0	75.0	75.0	75.0
0.65	12.00	61.681	66.963	5.282		77.0		77.0	48	0.3345	15.0	75.0	75.0	75.0
0.65	12.00	66.963	72.244	5.281		77.0		78.0	48	0.3345	15.0	75.0	75.0	75.0
1.90	7.00	73.100	78.511	5.411		79.0		80.0	63	0.5915	12.0	76.0	76.0	76.0
1.90	7.00	78.511	83.921	5.410		80.0		81.0	63	0.5915	12.0	76.0	76.0	76.0
1.90	7.00	83.921	89.328	5.407		81.0		81.0	63	0.5915	12.0	76.0	76.0	76.0
3.20	5.00	91.600	96.694	5.094		82.0		83.0	73	0.7878	11.0	76.0	76.0	76.0
3.20	5.00	96.694	101.807	5.113		83.0		84.0	73	0.7878	11.0	76.0	76.0	76.0
3.20	5.00	101.807	106.904	5.097		84.0		85.0	73	0.7878	11.0	76.0	76.0	76.0

RY GAS METER		ORIFICE				DRY GAS METER CALIBRATION FACTOR	ORIFICE CALIBRATION FACTOR	Individual Run	Individual Orifice	Orifice Average	Orifice Average
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)		Y Value (number)	dH@ Value (in H2O)	0.95 < Y < 1.05?	Ymax - Ymin < 0.010?	0.98 < Y/Yd < 1.02?	dH@ - dH@ av < 0.155?
5.300	150.1	5.214	147.7	5.298		0.984	1.772	Pass			
5.289	149.8	5.214	147.7	5.298		0.986	1.779	Pass			
5.312	150.4	5.214	147.7	5.298		0.981	1.780	Pass			
					Average	**0.984**	**1.777**		**Pass**	**Pass**	**Pass**
5.215	147.7	5.199	147.2	5.263		0.997	1.922	Pass			
5.207	147.5	5.199	147.2	5.263		0.998	1.918	Pass			
5.201	147.3	5.199	147.2	5.263		1.000	1.916	Pass			
					Average	**0.998**	**1.919**		**Pass**	**Pass**	**Pass**
5.325	150.8	5.358	151.8	5.435		1.006	1.787	Pass			
5.314	150.5	5.358	151.8	5.435		1.008	1.784	Pass			
5.307	150.3	5.358	151.8	5.435		1.010	1.782	Pass			
					Average	**1.008**	**1.785**		**Pass**	**Pass**	**Pass**
5.001	141.6	5.098	144.4	5.170		1.019	1.688	Pass			
5.011	141.9	5.098	144.4	5.170		1.017	1.685	Pass			
4.986	141.2	5.098	144.4	5.170		1.022	1.681	Pass			
					Average	**1.020**	**1.685**		**Pass**	**Pass**	**Pass**

Average Yd: 1.002 **dH@: 1.791**

Q @ dH = 1: 0.560

SIGNED: Signature on File

Date: 10/4/2019

Note: Control box not equipped with meter inlet temperature reading.

MONTROSE
AIR QUALITY SERVICES

THERMOCOUPLE CALIBRATION

Thermocouple ID: 43
Date: 12/31/2019
Performed By: RD/DA/RH/AD

Calibrated Digital Temperature Readout ID: PTC-9
T1 Reference Thermometer ID: 242196
T2 Reference Thermometer ID: 242196
T3 Reference Thermometer ID: 242167

T/C I.D. 43	Readout I.D.	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	Reference Thermometer °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T3 (OIL)	PTC-9	358	358	358	358	360	360	360	360	2.0	0.2%	Pass
T2 (Boiling H_2O)	PTC-9	209	209	209	209	212	212	212	212	3.0	0.4%	Pass
T1 (Ice/Water)	PTC-9	31	31	31	31	32	32	32	32	1.0	0.2%	Pass

1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

MONTROSE AIR QUALITY SERVICES

DIGITAL TEMPERATURE READOUT CALIBRATION

Digital Temperature Readout ID: PTC-42
Readout Description: Handheld
Date: 12/30/2019
Performed By: RD/DA/RH/AD

Calibrated Thermocouple ID: TC-CAL
T1 Reference Thermometer ID: 242196
T2 Reference Thermometer ID: 242196
T3 Reference Thermometer ID: 242167

T/C I.D. TC-CAL	Readout I.D.	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	Reference Thermometer °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T3 (OIL)	PTC-42	360	360	360	360	360	360	360	360	0.0	0.0%	Pass
T2 (Boiling H_2O)	PTC-42	212	212	212	212	212	212	212	212	0.0	0.0%	Pass
T1 (Ice/Water)	PTC-42	32	32	32	32	32	32	32	32	0.0	0.0%	Pass

1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

Thermocouple Source Readings

	T/C Source S/N	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	T/C Source °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T4 (~650 F)	S/N 106970	650	650	650	650	650	650	650	650	0.0	0.0%	Pass
T3 (~370 F)	S/N 106970	360	360	360	360	360	360	360	360	0.0	0.0%	Pass
T2 (~212 F)	S/N 106970	210	210	210	210	212	212	212	212	2.0	0.3%	Pass
T1 (~32 F)	S/N 106970	32	32	32	32	32	32	32	32	0.0	0.0%	Pass

1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

MONTROSE AIR QUALITY SERVICES

DIGITAL TEMPERATURE READOUT CALIBRATION

Digital Temperature Readout ID: 40-WCS
Readout Description: Control Box
Date: 12/30/2019
Performed By: RD/DA/RH/AD

Calibrated Thermocouple ID: TC-CAL
T1 Reference Thermometer ID: 242196
T2 Reference Thermometer ID: 242196
T3 Reference Thermometer ID: 242167

T/C I.D. TC-CAL	Readout I.D.	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	Reference Thermometer °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T3 (OIL)	40-WCS	360	360	360	360	360	360	360	360	0.0	0.0%	Pass
T2 (Boiling H_2O)	40-WCS	212	212	212	212	212	212	212	212	0.0	0.0%	Pass
T1 (Ice/Water)	40-WCS	32	32	32	32	32	32	32	32	0.0	0.0%	Pass

1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

Thermocouple Source Readings

	T/C Source S/N	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	T/C Source °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T4 (~650 F)	S/N 106970	651	651	651	651	650	650	650	650	1.0	0.1%	Pass
T3 (~370 F)	S/N 106970	357	357	357	357	360	360	360	360	3.0	0.4%	Pass
T2 (~212 F)	S/N 106970	213	213	213	213	212	212	212	212	1.0	0.1%	Pass
T1 (~32 F)	S/N 106970	33	33	33	33	32	32	32	32	1.0	0.2%	Pass

1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

MONTROSE AIR QUALITY SERVICES

DIGITAL TEMPERATURE READOUT CALIBRATION

Digital Temperature Readout ID: 17-WCS
Readout Description: Control Box
Date: 12/30/2019
Performed By: RD/DA/RH/AD

Calibrated Thermocouple ID: TC-CAL
T1 Reference Thermometer ID: 242196
T2 Reference Thermometer ID: 242196
T3 Reference Thermometer ID: 242167

T/C I.D. TC-CAL	Readout I.D.	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	Reference Thermometer °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T3 (OIL)	17-WCS	360	360	360	360	360	360	360	360	0.0	0.0%	Pass
T2 (Boiling H_2O)	17-WCS	212	212	212	212	212	212	212	212	0.0	0.0%	Pass
T1 (Ice/Water)	17-WCS	32	32	32	32	32	32	32	32	0.0	0.0%	Pass

1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

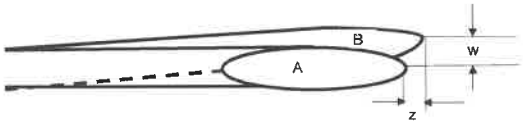
Thermocouple Source Readings

	T/C Source S/N	T/C - Readout °F Reading 1	Reading 2	Reading 3	Average	T/C Source °F Reading 1	Reading 2	Reading 3	Average	Difference °F	%, (°R)	
T4 (~650 F)	S/N 106970	647	647	647	647	650	650	650	650	3.0	0.3%	Pass
T3 (~370 F)	S/N 106970	358	358	358	358	360	360	360	360	2.0	0.2%	Pass
T2 (~212 F)	S/N 106970	210	210	210	210	212	212	212	212	2.0	0.3%	Pass
T1 (~32 F)	S/N 106970	31	31	31	31	32	32	32	32	1.0	0.2%	Pass

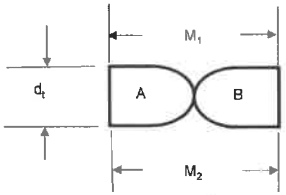
1) Difference % (°R) = Difference (°F) / (Average Tref + 460)
2) Pass if all Differences are less than 1.5% (°R)

MONTROSE

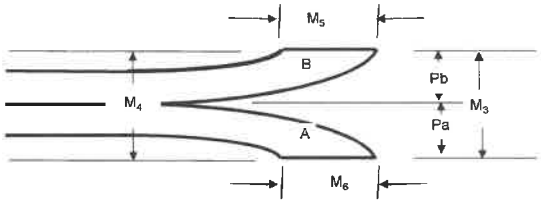
S Type Pitot Tube Dimensional Calibration Record



Side View



End View



Top View

Acceptability Criteria			z < 1/8"	w < 1/32"	Yes	"3/16" < Dt < 3/8"	n/a	n/a	n/a	n/a	n/a	n/a	10 degrees	5 degrees	1.05 Dt < P < 1.5 Dt	
Pitot ID	Date	Calibrated By	Side View, Impact openings Properly aligned, z < 1/8"	Side View, Impact openings Properly aligned, w < 1/32"	Pa = Pb	Tubing Diameter, dt	M1	M2	M3	M4	M5	M6	Average Face Opening Plane Angle, offset from perpendicular to transverse axis	Average Face Opening Plane Frontal Angle from parallel to Longitudinal Axis	Ratio of P/Dt	Status
043	12/30/19	DA	Y	Y	Y	0.375	0.842	0.845	0.841	0.864	0.380	0.397	-0.2	-1.7	1.1	Pass

Notes: Reference "A Type-S Pitot Tube Calibration Study", Robert F. Vollaro, October 15, 1975
If tube is not visibly deformed it is assumed that Pa = Pb = .5 x avg. of M1 & M2, and that average face opening plane angles represent individual angles to tube axis

APPENDIX B
CALCULATIONS

Appendix B.1
General Emissions Calculations

GENERAL EMISSION CALCULATIONS

I. Stack Gas Velocity

A. Stack gas molecular weight, lb/lb-mole

$$MW_{dry} = 0.44 * \%CO_2 + 0.32 * \%O_2 + 0.28 * \%N_2$$

$$MW_{wet} = MW_{dry} * (1 - B_{wo}) + 18 * B_{wo}$$

B. Absolute stack pressure, iwg

$$Ps = Pbar + \frac{Psg}{13.6}$$

C. Stack gas velocity, ft/sec

$$V_s = 2.9 * C_p * \sqrt{\Delta P} * \sqrt{T_s} * \sqrt{\frac{29.92 * 28.95}{P_s * MW_{wet}}}$$

II. Moisture

A. Sample gas volume, dscf

$$V_{mstd} = 0.03342 * V_m * (P_{bar} + \frac{\Delta H}{13.6}) * \frac{T_{ref}}{T_m} * Y_d$$

B. Water vapor volume, scf

$$V_{wstd} = 0.0472 * V_{lc} * \frac{T_{ref}}{528\ ^oR}$$

C. Moisture content, dimensionless

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

III. Stack gas volumetric flow rate

A. Actual stack gas volumetric flow rate, wacfm

$$Q = V_s * A_s * 60$$

B. Standard stack gas flow rate, dscfm

$$Q_{sd} = Q * (1 - B_{wo}) * \frac{T_{ref}}{T_s} * \frac{P_s}{29.92}$$

IV. Gaseous Mass Emission Rates, lb/hr

$$M = \frac{ppm * MW_i * Q_{sd} * 60}{SV * 10^6}$$

V. Emission Rates, lb/MMBtu

$$\frac{lb}{MMBtu} = \frac{ppm * MW_i * F}{SV * 10^6} * \frac{20.9}{20.9 - \%O_2}$$

VI. Percent Isokinetic

$$I = \frac{17.32 \text{ x } T_s\ (V_m std)}{(1\text{-}Bwo)\ 0 \text{ x } Vs \text{ x } Ps \text{ x } Dn2} \text{ x } \frac{520°R}{T_{ref}}$$

VII. Particulate emissions

(a) Grain loading, gr/dscf
$C = 0.01543\ (M_n/V_{m\ std})$

(b) Grain loading at 12% CO_2, gr/dscf
$C_{12\%}\ CO_2 = C\ (12/\%\ CO_2)$

(c) Mass emissions, lb/hr
M = C x Qsd x (60 min/hr)/(7000 gr/lb)

(d) Particulate emission factor

$$lb/10^6\ Btu = Cx\ \frac{1\ lb}{7000\ gr}\ x\ F\ x\ \frac{20.9}{20.9 - \%\ O_2}$$

Nomenclature:

A_s	= stack area, ft^2
B_{wo}	= flue gas moisture content, dimensionless
$C_{12\%CO2}$	= particulate grain loading, gr/dscf corrected to 12% CO_2
C	= particulate grain loading, gr/dscf
C_p	= pitot calibration factor, dimensionless
Dn	= nozzle diameter, in.
F	= fuel F-Factor, dscf/MMBtu @ 0% O_2
H	= orifice differential pressure, iwg
I	= % isokinetics
M_n	= mass of collected particulate, mg
M_i	= mass emission rate of specie i, lb/hr
MW	= molecular weight of flue gas, lb/lb-mole
M_{wi}	= molecular weight of specie i:
	SO_2: 64
	NO_x: 46
	CO: 28
	HC: 16
0	= sample time, min.
ΔP	= average velocity head, iwg = $(\sqrt{\Delta P})^2$
P_{bar}	= barometric pressure, inches Hg
P_s	= stack absolute pressure, inches Hg
P_{sg}	= stack static pressure, iwb
Q	= wet stack flow rate at actual conditions, wacfm
Q_{sd}	= dry standard stack flow rate, dscfm
SV	= specific molar volume of an ideal gas at standard conditions, ft^3/lb-mole
T_m	= meter temperature, °R
T_{ref}	= reference temperature, °R
T_s	= stack temperature, °R
V_s	= stack gas velocity, ft/sec
V_{lc}	= volume of liquid collected in impingers, ml
V_m	= uncorrected dry meter volume, dcf
V_{mstd}	= dry meter volume at standard conditions, dscf
V_{wstd}	= volume of water vapor at standard conditions, scf
Y_d	= meter calibration coefficient

RATA SPECIFIC EMISSION CALCULATIONS

The following equations are used for Relative Accuracy Test Audit (RATA) Computational Procedures:

1. <u>Stack Gas Corrected Concentration</u>

   a. $$C_{gas} = \left(\overline{C} - C_o\right)\frac{C_{ma}}{C_m - C_o}$$

2. <u>Relative Accuracy Calculations</u>

   a. Average Difference

   $$\overline{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$$

   b. Standard Deviation

   $$S_d = \left[\frac{\sum_{i=1}^{n} d_i^{\,2} - \frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}}{n-1}\right]^{1/2}$$

   c. Confidence Coefficient

   $$CC = t_{0.975}\,\frac{S_d}{\sqrt{n}}$$

   d. Relative Accuracy

   $$RA = \frac{\left|\overline{d}\right| + \left|cc\right|}{\overline{RM}} x100$$

   e. Reference Method Average

   $$\overline{RM} = \frac{1}{n}\sum_{i=1}^{n} RM_i$$

3. Bias Adjustment Factor

a. $$BAF = 1 + \frac{|\bar{d}|}{\overline{CEM}}$$

4. Nomenclature

C_{gas}	=	Corrected Stack Gas Concentration, ppm dry
$\overline{C}$	=	Average Gas Concentration, ppm dry
C_o	=	Average of the Initial and Final Zero Bias Check
C_m	=	Average of the Initial and Final Upscale Bias Check
C_{ma}	=	Actual Value of Upscale Calibration Gas Concentration
$\bar{d}$	=	Arithmetic Mean
S_d	=	Standard Deviation
N	=	Number of Tests
CC	=	Confidence Coefficient
RA	=	Relative Accuracy
RM	=	Reference Method
$t_{0.975}$	=	t Value
$\lvert d \rvert$	=	Absolute Value of the Mean Difference

Appendix B.2
Unit 1 Calculations

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION
GENERAL

Test:	1-RA-U1
Date:	3/12/2020
Start Time:	7:00
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	842.6	717.4	125.2
2/H2O	625.2	621.9	3.3
3/Empty	651.6	649.5	2.1
4/S.G.	949.9	940.0	9.9
Rinse		50.0	-50.0
Total			90.5

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	98.700	79	
		80	
Stop	124.996	85	
Total	26.296		81.3

Summary

Sample Volume:	25.853	dscf
H_2O Volume :	4.272	scf
Moisture Content:	14.2	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.60	1.2649	353	88.63
4	1.40	1.1832	355	83.01
3	1.30	1.1402	356	80.04
2	1.20	1.0954	359	77.04
1	1.10	1.0488	358	73.71
5	1.40	1.1832	356	83.06
4	1.20	1.0954	357	76.95
3	1.10	1.0488	358	73.71
2	1.20	1.0954	359	77.04
1	1.10	1.0488	358	73.71
5	1.30	1.1402	357	80.09
4	1.00	1.0000	358	70.28
3	1.00	1.0000	358	70.28
2	0.98	0.9899	357	69.53
1	0.95	0.9747	356	68.42
5	0.94	0.9695	355	68.02
4	0.93	0.9644	356	67.70
3	0.88	0.9381	357	65.89
2	0.94	0.9695	358	68.14
1	1.00	1.0000	358	70.28
5	0.98	0.9899	355	69.45
4	0.91	0.9539	356	66.96
3	0.85	0.9220	357	64.76
2	0.87	0.9327	358	65.56
1	0.90	0.9487	356	66.60
5	1.10	1.0488	356	73.62
4	0.95	0.9747	355	68.38
3	1.00	1.0000	357	70.24
2	0.97	0.9849	358	69.22
1	1.20	1.0954	357	76.95
Average	1.0679	1.0334	356.8	72.58

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Analyzer Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.04	0.01
Pre Test Span Direct	10.53	10.53	47.62	4.74
Pre-test Zero	0.15	0.05	0.14	0.05
Pre-test Span	10.50	10.46	47.65	4.75
0-30 min	9.30	11.04	39.64	0.19
Post Test Zero Direct	0.02	0.05	0.04	0.01
Post Test Span Direct	10.55	10.45	47.62	4.75
Post-test Zero	0.03	0.05	0.08	0.06
Post-test Span	10.48	10.41	47.37	4.77
Average	9.30	11.04	39.64	0.19
Corr. Results	9.28	11.09	39.44	0.14
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.2%	0.3%	0.4%	0.0%
Pre-Test Zero Bias	0.7%	0.0%	0.1%	0.5%
Pre-Test Span Bias	-0.2%	-0.4%	0.0%	0.0%
Post-Test Zero Bias	0.0%	0.0%	0.0%	0.4%
Post-Test Span Bias	-0.4%	-0.2%	-0.3%	0.2%
Zero Drift	-0.6%	0.0%	-0.1%	0.1%
Span Drift	-0.1%	-0.3%	-0.3%	0.3%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.283	% dry
	7.966	% wet
CO_2:	11.093	% dry
	9.520	% wet
NO_x:	39.444	ppm dry
	33.851	ppm wet
	26.533	lb/hr
SO_2:	9.1638911	ppm dry
SO2:	8.576	lb/hr
CO:	0.14	ppm dry
	0.12	ppm wet
	0.056	lb/hr
H_2O:	14.2	%
MW:	28.42	lb/lb-mole
Flow:	169,132	wacfm
	93.91	mdscfm
	5634.40	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5634.40	5478.73	155.67	2.8%
O_2	% dry	9.28	9.4	-0.12	-1.3%
CO_2	% dry	11.09	11.4	-0.26	-2.4%
NO_x	ppm dry	39.44	41.3	-1.89	-4.8%
NO_x	ppm @ 3% O_2	60.77	63.8	-3.01	-5.0%
NO_x	lb/hr	26.53	27.23	-0.70	-2.6%
SO_2	ppm dry	9.16	8.72	0.44	4.9%
SO_2	ppm @ 3% O_2	14.12	13.51	0.61	4.3%
SO_2	lb/hr	8.58	7.957	0.620	7.2%
CO	ppm dry	0.14	3.05	-2.91	
CO	ppm @ 3% O_2	0.21	4.76	-4.54	
CO	lb/hr	0.056	1.216	-1.16	

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	473	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	2.44	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION
GENERAL

Test:	2-RA-U1
Date:	3/12/2020
Start Time:	7:43
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	858.3	730.1	128.2
2/H2O	685.6	683.4	2.2
3/Empty	606.2	605.9	0.3
4/S.G.	1048.0	1041.6	6.4
Rinse		50.0	-50.0
Total			87.1

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	126.500	85	
		88	
Stop	152.744	88	
Total	26.244		87.0

Summary

Sample Volume:	25.535	dscf
H_2O Volume :	4.111	scf
Moisture Content:	13.9	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.500	1.2247	354	85.81
4	1.400	1.1832	355	82.95
3	1.200	1.0954	356	76.85
2	1.100	1.0488	357	73.62
1	1.000	1.0000	357	70.20
5	1.400	1.1832	358	83.11
4	1.300	1.1402	358	80.08
3	1.100	1.0488	359	73.71
2	1.100	1.0488	358	73.67
1	1.100	1.0488	357	73.62
5	1.300	1.1402	357	80.03
4	1.100	1.0488	358	73.67
3	0.990	0.9950	359	69.93
2	0.970	0.9849	360	69.26
1	0.950	0.9747	358	68.46
5	0.960	0.9798	358	68.82
4	0.920	0.9592	359	67.41
3	0.900	0.9487	360	66.72
2	0.950	0.9747	361	68.59
1	1.100	1.0488	360	73.76
5	1.000	1.0000	355	70.11
4	0.920	0.9592	356	67.29
3	0.830	0.9110	57	50.87
2	0.850	0.9220	358	64.76
1	0.880	0.9381	358	65.89
5	1.000	1.0000	357	70.20
4	0.940	0.9695	358	68.10
3	0.990	0.9950	357	69.84
2	0.960	0.9798	358	68.82
1	1.000	1.0000	355	70.11
Average	1.0507	1.0250	347.6	71.54

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Analyzer Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.02	0.05	0.04	0.01
Pre Test Span Direct	10.55	10.45	47.62	4.75
Pre-test Zero	0.03	0.05	0.08	0.06
Pre-test Span	10.48	10.41	47.37	4.77
0-30 min	9.42	10.93	40.06	0.15
Post Test Zero Direct	0.00	0.05	0.05	-0.01
Post Test Span Direct	10.52	10.42	47.78	4.72
Post-test Zero	0.02	0.06	0.09	0.05
Post-test Span	10.43	10.34	47.01	4.74
Average	9.42	10.93	40.06	0.15
Corr. Results	9.44	11.05	40.14	0.09
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.4%	-0.2%	0.4%	0.1%
Pre-Test Zero Bias	0.0%	0.0%	0.0%	0.4%
Pre-Test Span Bias	-0.4%	-0.2%	-0.3%	0.2%
Post-Test Zero Bias	0.1%	0.0%	0.0%	0.6%
Post-Test Span Bias	-0.5%	-0.4%	-0.8%	0.2%
Zero Drift	0.0%	0.0%	0.0%	0.0%
Span Drift	-0.3%	-0.3%	-0.4%	-0.4%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.443	% dry
	8.133	% wet
CO_2:	11.047	% dry
	9.515	% wet
NO_x:	40.140	ppm dry
	34.574	ppm wet
	27.018	lb/hr
SO_2:	8.515249	ppm dry
	7.974	lb/hr
CO:	0.09	ppm dry
	0.08	ppm wet
	0.039	lb/hr
H_2O:	13.9	%
MW:	28.46	lb/lb-mole
Flow:	166,721	wacfm
	93.963	mdscfm
	5637.78	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5637.78	5447.83	189.94	3.4%
O_2	% dry	9.44	9.5	-0.05	-0.6%
CO_2	% dry	11.05	11.3	-0.23	-2.1%
NO_x	ppm dry	40.14	41.7	-1.54	-3.8%
NO_x	ppm @ 3% O_2	62.71	65.0	-2.25	-3.6%
NO_x	lb/hr	27.02	27.3	-0.30	-1.1%
SO_2	ppm dry	8.52	8.60	-0.08	-1.0%
SO_2	ppm @ 3% O_2	13.30	13.44	-0.14	-1.1%
SO_2	lb/hr	7.974	7.819	0.156	2.0%
CO	ppm dry	0.09	2.78	-2.68	
CO	ppm @ 3% O_2	0.15	4.37	-4.22	
CO	lb/hr	0.039	1.102		

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	422	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	2.51	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION

GENERAL

Test:	3-RA-U1
Date:	3/12/2020
Start Time:	8:29
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA

Impingers

#/Matl.	End	Start	Diff.
1/H2O	866.1	738.6	127.5
2/H2O	656.0	654.0	2.0
3/Empty	651.7	651.6	0.1
4/S.G.	951.8	949.9	1.9
Rinse		50.0	-50.0
Total			81.5

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	154.000	86	
		90	
Stop	180.471	93	
Total	26.471		89.7

Summary

Sample Volume:	25.631	dscf
H_2O Volume :	3.847	scf
Moisture Content:	13.1	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.600	1.2649	358	88.69
4	1.300	1.1402	360	80.04
3	1.100	1.0488	361	73.67
2	1.100	1.0488	360	73.63
1	1.000	1.0000	361	70.25
5	1.400	1.1832	358	82.96
4	1.200	1.0954	359	76.86
3	1.200	1.0954	360	76.90
2	1.000	1.0000	361	70.25
1	1.000	1.0000	360	70.20
5	1.400	1.1832	355	82.81
4	1.000	1.0000	358	70.12
3	0.980	0.9899	359	69.45
2	0.980	0.9899	360	69.50
1	0.930	0.9644	358	67.62
5	0.970	0.9849	355	68.93
4	0.900	0.9487	358	66.52
3	0.870	0.9327	359	65.44
2	0.990	0.9950	359	69.81
1	1.000	1.0000	357	70.07
5	1.100	1.0488	355	73.40
4	0.940	0.9695	356	67.90
3	0.850	0.9220	357	64.61
2	0.820	0.9055	358	63.49
1	0.870	0.9327	357	65.36
5	1.200	1.0954	355	76.67
4	0.930	0.9644	356	67.54
3	0.980	0.9899	358	69.41
2	0.950	0.9747	357	68.30
1	0.990	0.9950	352	69.51
Average	1.0447	1.0221	357.9	71.66

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.05	-0.01
Pre Test Span Direct	10.52	10.42	47.78	4.72
Pre-test Zero	0.02	0.06	0.09	0.05
Pre-test Span	10.43	10.34	47.01	4.74
0-30 min	9.35	10.91	40.42	0.19
Post Test Zero Direct	0.01	0.05	0.06	0.02
Post Test Span Direct	10.54	10.40	47.78	4.75
Post-test Zero	0.03	0.06	0.09	0.07
Post-test Span	10.45	10.36	47.21	4.79
Average	9.35	10.91	40.42	0.19
Corr. Results	9.38	11.05	40.57	0.13
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	0.2%	-0.3%	0.5%	-0.2%
Pre-Test Zero Bias	0.1%	0.0%	0.0%	0.6%
Pre-Test Span Bias	-0.5%	-0.4%	-0.8%	0.2%
Post-Test Zero Bias	0.1%	0.1%	0.0%	0.5%
Post-Test Span Bias	-0.5%	-0.3%	-0.6%	0.4%
Zero Drift	0.0%	0.0%	0.0%	0.2%
Span Drift	0.1%	0.1%	0.2%	0.5%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.383	% dry
	8.159	% wet
CO_2:	11.054	% dry
	9.612	% wet
NO_x:	40.569	ppm dry
	35.275	ppm wet
	27.265	lb/hr
SO_2:	8.5945496	ppm dry
	8.036	lb/hr
CO:	0.13	ppm dry
	0.12	ppm wet
	0.054	lb/hr
H_2O:	13.1	%
MW:	28.56	lb/lb-mole
Flow:	167,007	wacfm
	93.82	mdscfm
	5629.25	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5629.25	5357	272.18	4.8%
O_2	% dry	9.38	9.5	-0.10	-1.0%
CO_2	% dry	11.05	11.3	-0.21	-1.9%
NO_x	ppm dry	40.57	42.4	-1.82	-4.5%
NO_x	ppm @ 3% O_2	63.06	66.1	-3.04	-4.8%
NO_x	lb/hr	27.27	27.23	0.03	0.1%
SO_2	ppm dry	8.59	8.87	-0.28	-3.2%
SO_2	ppm @ 3% O_2	13.36	13.85	-0.49	-3.7%
SO_2	lb/hr	8.036	7.924	0.112	1.4%
CO	ppm dry	0.13	2.11	-1.97	
CO	ppm @ 3% O_2	0.21	3.30	-3.10	
CO	lb/hr	0.054	0.820	-0.77	

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	490	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	2.19	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION

GENERAL

Test:	4-RA-U1
Date:	3/12/2020
Start Time:	9:13
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA

Impingers

#/Matl.	End	Start	Diff.
1/H2O	889.1	765.5	123.6
2/H2O	676.6	675.8	0.8
3/Empty	607.0	606.5	0.5
4/S.G.	1054.6	1048.0	6.6
Rinse		50.0	-50.0
Total			81.5

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	182.000	91	
		91	
Stop	208.654	93	
Total	26.654		91.7

Summary

Sample Volume:	25.714	dscf
H_2O Volume :	3.847	scf
Moisture Content:	13.0	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.500	1.2247	355	85.68
4	1.400	1.1832	56	65.87
3	1.300	1.1402	358	79.91
2	1.100	1.0488	357	73.47
1	1.000	1.0000	355	69.96
5	1.300	1.1402	356	79.82
4	1.200	1.0954	357	76.73
3	1.100	1.0488	358	73.51
2	1.100	1.0488	358	73.51
1	1.000	1.0000	355	69.96
5	1.300	1.1402	354	79.72
4	1.100	1.0488	355	73.38
3	1.000	1.0000	356	70.00
2	0.950	0.9747	357	68.27
1	0.910	0.9539	358	66.86
5	0.930	0.9644	355	67.47
4	0.940	0.9695	356	67.87
3	0.850	0.9220	357	64.58
2	0.960	0.9798	355	68.55
1	0.990	0.9950	354	69.57
5	1.200	1.0954	356	76.69
4	0.930	0.9644	357	67.55
3	0.840	0.9165	358	64.24
2	0.810	0.9000	358	63.08
1	0.850	0.9220	355	64.50
5	1.300	1.1402	354	79.72
4	0.920	0.9592	353	67.02
3	0.970	0.9849	352	68.78
2	0.960	0.9798	353	68.46
1	1.000	1.0000	354	69.92
Average	1.0500	1.0247	345.7	71.15

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.01	0.05	0.06	0.02
Pre Test Span Direct	10.54	10.40	47.78	4.75
Pre-test Zero	0.03	0.06	0.09	0.07
Pre-test Span	10.45	10.36	47.21	4.79
0-30 min	9.18	11.09	38.28	0.20
Post Test Zero Direct	0.01	0.05	0.07	-0.01
Post Test Span Direct	10.50	10.43	47.76	4.72
Post-test Zero	0.03	0.06	0.09	0.05
Post-test Span	10.41	10.36	47.08	4.75
Average	9.18	11.09	38.28	0.20
Corr. Results	9.22	11.22	38.39	0.14
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	0.3%	-0.4%	0.5%	0.1%
Pre-Test Zero Bias	0.1%	0.1%	0.0%	0.5%
Pre-Test Span Bias	-0.5%	-0.3%	-0.6%	0.4%
Post-Test Zero Bias	0.1%	0.0%	0.0%	0.5%
Post-Test Span Bias	-0.5%	-0.4%	-0.8%	0.4%
Zero Drift	0.0%	0.0%	0.0%	-0.2%
Span Drift	-0.2%	0.0%	-0.1%	-0.4%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.218	% dry
	8.018	% wet
CO_2:	11.224	% dry
	9.764	% wet
NO_x:	38.393	ppm dry
	33.397	ppm wet
	26.017	lb/hr
SO_2:	6.4682569	ppm dry
	6.098	lb/hr
CO:	0.14	ppm dry
	0.13	ppm wet
	0.060	lb/hr
H_2O:	13.0	%
MW:	28.58	lb/lb-mole
Flow:	165,821	wacfm
	94.60	mdscfm
	5676.07	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5676.07	5353.10	322.97	5.7%
O_2	% dry	9.22	9.3	-0.07	-0.7%
CO_2	% dry	11.22	11.4	-0.21	-1.9%
NO_x	ppm dry	38.39	40.0	-1.61	-4.2%
NO_x	ppm @ 3% O_2	58.83	61.5	-2.68	-4.6%
NO_x	lb/hr	26.02	25.6347	0.38	1.5%
SO_2	ppm dry	6.47	7.04	-0.57	-8.8%
SO_2	ppm @ 3% O_2	9.91	10.83	-0.92	-9.3%
SO_2	lb/hr	6.098	6.264	-0.166	-2.7%
CO	ppm dry	0.14	2.29	-2.15	
CO	ppm @ 3% O_2	0.22	3.53	-3.31	
CO	lb/hr	0.060	0.892		

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	463	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	1.75	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION

GENERAL

Test:	5-RA-U1	
Date:	3/12/2020	
Start Time:	9:57	
Station:	Desert View Power	
Unit:	#1	
Test Condition:	Full Load	
Performed By:	DW	

PRE-TEST INFORMATION

SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA

Impingers

#/Matl.	End	Start	Diff.
1/H2O	760.3	633.9	126.4
2/H2O	729.7	728.0	1.7
3/Empty	649.8	649.5	0.3
4/S.G.	956.7	951.8	4.9
Rinse		50.0	-50.0
Total			83.3

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	210.000	93	
		93	
Stop	236.416	92	
Total	26.416		92.7

Summary

Sample Volume:	25.438	dscf
H_2O Volume :	3.932	scf
Moisture Content:	13.4	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.600	1.2649	355	88.57
4	1.400	1.1832	356	82.90
3	1.200	1.0954	357	76.80
2	1.100	1.0488	358	73.57
1	1.100	1.0488	357	73.53
5	1.400	1.1832	356	82.90
4	1.300	1.1402	358	79.98
3	1.100	1.0488	359	73.62
2	1.000	1.0000	360	70.24
1	1.000	1.0000	359	70.19
5	1.200	1.0954	354	76.66
4	1.200	1.0954	355	76.71
3	1.100	1.0488	356	73.48
2	0.940	0.9695	357	67.97
1	0.930	0.9644	358	67.65
5	0.960	0.9798	356	68.65
4	0.920	0.9592	355	67.16
3	0.880	0.9381	354	65.65
2	0.970	0.9849	353	68.88
1	0.960	0.9798	352	68.48
5	1.200	1.0954	353	76.61
4	0.910	0.9539	354	66.76
3	0.820	0.9055	355	63.41
2	0.800	0.8944	356	62.67
1	0.860	0.9274	357	65.02
5	1.400	1.1832	358	83.00
4	0.940	0.9695	359	68.06
3	0.990	0.9950	359	69.84
2	0.950	0.9747	358	68.37
1	1.000	1.0000	357	70.11
Average	1.0628	1.0309	356.4	72.25

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.01	0.05	0.07	-0.01
Pre Test Span Direct	10.50	10.43	47.76	4.72
Pre-test Zero	0.03	0.06	0.09	0.05
Pre-test Span	10.41	10.36	47.08	4.75
0-30 min	9.25	11.02	39.62	0.17
Post Test Zero Direct	0.01	0.05	0.05	-0.01
Post Test Span Direct	10.47	10.43	47.61	4.71
Post-test Zero	0.03	0.06	0.07	0.04
Post-test Span	10.41	10.33	47.29	4.74
Average	9.25	11.02	39.62	0.17
Corr. Results	9.31	11.17	39.70	0.12
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	0.1%	-0.2%	0.5%	-0.2%
Pre-Test Zero Bias	0.1%	0.0%	0.0%	0.5%
Pre-Test Span Bias	-0.5%	-0.4%	-0.8%	0.4%
Post-Test Zero Bias	0.1%	0.0%	0.0%	0.5%
Post-Test Span Bias	-0.3%	-0.5%	-0.4%	0.4%
Zero Drift	0.0%	0.0%	0.0%	0.0%
Span Drift	0.0%	-0.2%	0.2%	-0.1%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.312	% dry
	8.065	% wet
CO_2:	11.170	% dry
	9.674	% wet
NO_x:	39.705	ppm dry
	34.390	ppm wet
	26.848	lb/hr
SO_2:	7.2926267	ppm dry
	6.861	lb/hr
CO:	0.12	ppm dry
	0.11	ppm wet
	0.051	lb/hr
H_2O:	13.4	%
MW:	28.53	lb/lb-mole
Flow:	168,368	wacfm
	94.40	mdscfm
	5663.77	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5663.77	5327.07	336.70	5.9%
O_2	% dry	9.31	9.4	-0.04	-0.4%
CO_2	% dry	11.17	11.4	-0.20	-1.8%
NO_x	ppm dry	39.70	41.3	-1.57	-4.0%
NO_x	ppm @ 3% O_2	61.33	63.7	-2.34	-3.8%
NO_x	lb/hr	26.85	26.3880	0.46	1.7%
SO_2	ppm dry	7.29	8.21	-0.92	-12.6%
SO_2	ppm @ 3% O_2	11.26	12.68	-1.42	-12.6%
SO_2	lb/hr	6.861	7.291	-0.430	-6.3%
CO	ppm dry	0.12	2.68	-2.56	
CO	ppm @ 3% O_2	0.19	4.16	-3.97	
CO	lb/hr	0.051	1.038	-0.99	

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	443	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	2.04	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION
GENERAL

Test:	6-RA-U1
Date:	3/12/2020
Start Time:	10:41
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	856.6	731.6	125.0
2/H2O	687.5	686.0	1.5
3/Empty	607.1	606.9	0.2
4/S.G.	1060.5	1054.5	6.0
Rinse		50.0	-50.0
Total			82.7

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	237.600	92	
		87	
Stop	263.680	87	
Total	26.080		88.7

Summary

Sample Volume:	25.298	dscf
H_2O Volume :	3.903	scf
Moisture Content:	13.4	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.500	1.2247	356	85.80
4	1.500	1.2247	356	85.80
3	1.300	1.1402	358	79.98
2	1.100	1.0488	357	73.52
1	1.000	1.0000	356	70.06
5	1.300	1.1402	355	79.83
4	1.300	1.1402	354	79.78
3	1.200	1.0954	354	76.65
2	1.000	1.0000	353	69.93
1	1.000	1.0000	354	69.97
5	1.300	1.1402	356	79.88
4	1.200	1.0954	355	76.70
3	1.000	1.0000	356	70.06
2	0.970	0.9849	356	69.00
1	0.920	0.9592	354	67.11
5	0.990	0.9950	356	69.71
4	0.900	0.9487	355	66.42
3	0.870	0.9327	355	65.30
2	0.940	0.9695	352	67.76
1	0.990	0.9950	351	69.49
5	1.200	1.0954	355	76.70
4	0.960	0.9798	353	68.52
3	0.810	0.9000	355	63.01
2	0.830	0.9110	355	63.79
1	0.880	0.9381	354	65.64
5	1.300	1.1402	354	79.78
4	0.960	0.9798	358	68.73
3	0.950	0.9747	356	68.28
2	0.980	0.9899	356	69.35
1	1.100	1.0488	357	73.52
Average	1.0673	1.0331	355.1	72.33

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.01	0.05	0.05	-0.01
Pre Test Span Direct	10.47	10.43	47.61	4.71
Pre-test Zero	0.03	0.06	0.07	0.04
Pre-test Span	10.41	10.33	47.29	4.74
0-30 min	9.20	11.04	38.80	0.17
Post Test Zero Direct	-0.09	0.05	0.03	0.02
Post Test Span Direct	10.50	10.39	47.74	4.76
Post-test Zero	0.03	0.06	0.06	0.05
Post-test Span	10.42	10.32	47.39	4.78
Average	9.20	11.04	38.80	0.17
Corr. Results	9.26	11.21	38.76	0.12
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	0.0%	-0.3%	0.3%	-0.3%
Pre-Test Zero Bias	0.1%	0.0%	0.0%	0.5%
Pre-Test Span Bias	-0.3%	-0.5%	-0.4%	0.4%
Post-Test Zero Bias	0.6%	0.1%	0.0%	0.3%
Post-Test Span Bias	-0.4%	-0.4%	-0.4%	0.2%
Zero Drift	0.0%	0.0%	0.0%	0.0%
Span Drift	0.1%	0.0%	0.1%	0.4%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.259	% dry
	8.022	% wet
CO_2:	11.213	% dry
	9.714	% wet
NO_x:	38.760	ppm dry
	33.579	ppm wet
	26.288	lb/hr
SO_2:	8.7554063	ppm dry
	8.262	lb/hr
CO:	0.12	ppm dry
	0.11	ppm wet
	0.051	lb/hr
H_2O:	13.4	%
MW:	28.54	lb/lb-mole
Flow:	168,570	wacfm
	94.68	mdscfm
	5680.90	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5680.90	5278.73	402.17	7.1%
O_2	% dry	9.26	9.3	-0.04	-0.4%
CO_2	% dry	11.21	11.4	-0.14	-1.2%
NO_x	ppm dry	38.76	40.4	-1.60	-4.1%
NO_x	ppm @ 3% O_2	59.60	61.8	-2.21	-3.7%
NO_x	lb/hr	26.29	25.5793	0.71	2.7%
SO_2	ppm dry	8.76	9.95	-1.20	-13.7%
SO_2	ppm @ 3% O_2	13.46	15.24	-1.78	-13.2%
SO_2	lb/hr	8.262	8.771	-0.510	-6.2%
CO	ppm dry	0.12	2.20	-2.07	
CO	ppm @ 3% O_2	0.19	3.39	-3.20	
CO	lb/hr	0.051	0.852		

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	415	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	2.60	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION
GENERAL

Test:	7-RA-U1
Date:	3/12/2020
Start Time:	11:25
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	767.0	636.0	131.0
2/H2O	748.0	745.7	2.3
3/Empty	649.2	648.1	1.1
4/S.G.	961.9	956.7	5.2
Rinse		50.0	-50.0
Total			89.6

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	264.800		
		87	
Stop	291.416	85	
		84	
Total	26.616		85.3

Summary

Sample Volume:	25.976	dscf
H_2O Volume :	4.229	scf
Moisture Content:	14.0	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.400	1.1832	356	83.07
4	1.500	1.2247	357	86.04
3	1.200	1.0954	355	76.86
2	1.100	1.0488	355	73.59
1	1.100	1.0488	354	73.54
5	1.300	1.1402	356	80.05
4	1.200	1.0954	352	76.72
3	1.200	1.0954	354	76.81
2	1.000	1.0000	351	69.99
1	1.100	1.0488	354	73.54
5	1.200	1.0954	357	76.95
4	1.300	1.1402	358	80.14
3	1.000	1.0000	357	70.25
2	0.940	0.9695	357	68.11
1	0.890	0.9434	355	66.19
5	0.970	0.9849	356	69.14
4	0.930	0.9644	354	67.62
3	0.900	0.9487	355	66.56
2	0.920	0.9592	352	67.17
1	0.960	0.9798	353	68.66
5	1.200	1.0954	356	76.91
4	0.930	0.9644	356	67.70
3	0.870	0.9327	358	65.56
2	0.850	0.9220	357	64.77
1	0.840	0.9165	356	64.34
5	1.200	1.0954	358	77.00
4	0.980	0.9899	358	69.58
3	0.940	0.9695	357	68.11
2	0.970	0.9849	355	69.10
1	1.200	1.0954	356	76.91
Average	1.0631	1.0311	355.5	72.37

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	-0.09	0.05	0.03	0.02
Pre Test Span Direct	10.50	10.39	47.74	4.76
Pre-test Zero	0.03	0.06	0.06	0.05
Pre-test Span	10.42	10.32	47.39	4.78
0-30 min	9.31	10.72	37.19	0.15
Post Test Zero Direct	0.01	0.05	0.04	0.01
Post Test Span Direct	10.48	10.45	47.80	4.74
Post-test Zero	0.02	0.05	0.06	0.03
Post-test Span	10.45	10.34	47.42	4.76
Average	9.31	10.72	37.19	0.15
Corr. Results	9.35	10.88	37.09	0.11
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	0.1%	-0.5%	0.5%	0.2%
Pre-Test Zero Bias	0.6%	0.1%	0.0%	0.3%
Pre-Test Span Bias	-0.4%	-0.4%	-0.4%	0.2%
Post-Test Zero Bias	0.1%	0.0%	0.0%	0.2%
Post-Test Span Bias	-0.2%	-0.6%	-0.4%	0.3%
Zero Drift	0.0%	0.0%	0.0%	-0.1%
Span Drift	0.1%	0.1%	0.0%	-0.2%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.350	% dry
	8.041	% wet
CO_2:	10.877	% dry
	9.354	% wet
NO_x:	37.094	ppm dry
	31.900	ppm wet
	24.972	lb/hr
SO_2:	5.9163241	ppm dry
	5.541	lb/hr
CO:	0.11	ppm dry
	0.10	ppm wet
	0.045	lb/hr
H_2O:	14.0	%
MW:	28.42	lb/lb-mole
Flow:	168,643	wacfm
	93.98	mdscfm
	5638.73	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5638.73	5272.93	365.80	6.5%
O_2	% dry	9.35	9.4	-0.03	-0.3%
CO_2	% dry	10.88	11.0	-0.10	-0.9%
NO_x	ppm dry	37.09	38.5	-1.36	-3.7%
NO_x	ppm @ 3% O_2	57.49	59.6	-2.07	-3.6%
NO_x	lb/hr	24.97	24.3150	0.66	2.6%
SO_2	ppm dry	5.92	6.74	-0.83	-14.0%
SO_2	ppm @ 3% O_2	9.17	10.58	-1.41	-15.4%
SO_2	lb/hr	5.541	5.936	-0.394	-7.1%
CO	ppm dry	0.11	1.60	-1.49	
CO	ppm @ 3% O_2	0.17	2.48	-2.31	
CO	lb/hr	0.045	0.613		

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	465	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	1.61	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION
GENERAL

Test:	8-RA-U1
Date:	3/12/2020
Start Time:	12:10
Station:	Desert View Power
Unit:	#1
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	880.0	740.4	139.6
2/H2O	685.9	685.6	0.3
3/Empty	607.4	607.1	0.3
4/S.G.	1065.8	1062.5	3.3
Rinse		50.0	-50.0
Total			93.5

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	292.200	81	
		80	
Stop	318.437	78	
Total	26.237		79.7

Summary

Sample Volume:	25.875	dscf
H_2O Volume :	4.413	scf
Moisture Content:	14.6	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.500	1.2247	357	86.24
4	1.400	1.1832	355	83.21
3	1.100	1.0488	357	73.85
2	1.200	1.0954	354	76.99
1	1.100	1.0488	355	73.76
5	1.200	1.0954	356	77.09
4	1.300	1.1402	357	80.29
3	1.100	1.0488	354	73.72
2	1.100	1.0488	354	73.72
1	1.100	1.0488	355	73.76
5	1.300	1.1402	354	80.14
4	1.200	1.0954	352	76.90
3	1.000	1.0000	353	70.24
2	0.900	0.9487	354	66.68
1	0.870	0.9327	354	65.56
5	0.990	0.9950	358	70.10
4	0.910	0.9539	357	67.17
3	0.880	0.9381	357	66.06
2	0.960	0.9798	355	68.91
1	0.940	0.9695	356	68.23
5	1.300	1.1402	357	80.29
4	0.940	0.9695	358	68.31
3	0.910	0.9539	356	67.13
2	0.820	0.9055	356	63.72
1	0.850	0.9220	356	64.88
5	1.200	1.0954	357	77.14
4	0.990	0.9950	354	69.93
3	0.950	0.9747	355	68.55
2	0.960	0.9798	356	68.95
1	1.100	1.0488	355	73.76
Average	1.0624	1.0307	355.5	72.51

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.01	0.05	0.04	0.01
Pre Test Span Direct	10.48	10.45	47.80	4.74
Pre-test Zero	0.02	0.05	0.06	0.03
Pre-test Span	10.45	10.34	47.42	4.76
0-30 min	9.40	10.27	40.85	0.12
Post Test Zero Direct	0.00	0.05	0.04	-0.02
Post Test Span Direct	10.46	10.46	47.83	4.69
Post-test Zero	0.02	0.05	0.07	0.01
Post-test Span	10.42	10.40	47.38	4.71
Average	9.40	10.27	40.85	0.12
Corr. Results	9.44	10.37	40.76	0.09
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	0.0%	-0.1%	0.6%	0.0%
Pre-Test Zero Bias	0.1%	0.0%	0.0%	0.2%
Pre-Test Span Bias	-0.2%	-0.6%	-0.4%	0.3%
Post-Test Zero Bias	0.1%	0.0%	0.0%	0.4%
Post-Test Span Bias	-0.2%	-0.3%	-0.5%	0.2%
Zero Drift	0.0%	0.0%	0.0%	-0.2%
Span Drift	-0.1%	0.3%	0.0%	-0.5%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.438	% dry
	8.063	% wet
CO_2:	10.374	% dry
	8.863	% wet
NO_x:	40.755	ppm dry
	34.817	ppm wet
	27.309	lb/hr
SO_2:	6.9802181	ppm dry
	6.508	lb/hr
CO:	0.09	ppm dry
	0.08	ppm wet
	0.038	lb/hr
H_2O:	14.6	%
MW:	28.28	lb/lb-mole
Flow:	168,977	wacfm
	93.55	mdscfm
	5612.72	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5612.72	5258.27	354.45	6.3%
O_2	% dry	9.44	9.5	-0.06	-0.6%
CO_2	% dry	10.37	10.5	-0.13	-1.3%
NO_x	ppm dry	40.76	41.9	-1.15	-2.8%
NO_x	ppm @ 3% O_2	63.65	65.6	-1.92	-3.0%
NO_x	lb/hr	27.31	26.3913	0.92	3.4%
SO_2	ppm dry	6.98	7.70	-0.72	-10.4%
SO_2	ppm @ 3% O_2	10.90	12.02	-1.12	-10.2%
SO_2	lb/hr	6.508	6.756	-0.248	-3.8%
CO	ppm dry	0.09	1.12	-1.03	
CO	ppm @ 3% O_2	0.14	1.76	-1.61	
CO	lb/hr	0.038	0.429		

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	423	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	2.08	

Montrose AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 1

PRE-TEST INFORMATION

GENERAL

Test:	9-RA-U1	
Date:	3/12/2020	
Start Time:	12:57	
Station:	Desert View Power	
Unit:	#1	
Test Condition:	Full Load	
Performed By:	DW	

PRE-TEST INFORMATION

SAMPLE TRAIN

Barom. Pressure:		psi
	29.92	"Hg
Meter No.	40-WCS	
Meter Y_d:	1.0020	
Meter Pressure:	2.5	iwg
Pstack:	0.38	iwg
Pstack:	29.94	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA

Impingers

#/Matl.	End	Start	Diff.
1/H2O	725.0	621.8	103.2
2/H2O	716.3	714.5	1.8
3/Empty	649.2	648.6	0.6
4/S.G.	968.7	961.9	6.8
Rinse		50.0	-50.0
Total			62.4

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	319.500	81	
		77	
Stop	345.928	74	
Total	26.428		77.3

Summary

Sample Volume:	26.176	dscf
H_2O Volume :	2.945	scf
Moisture Content:	10.1	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.600	1.2649	357	89.17
4	1.300	1.1402	355	80.28
3	1.200	1.0954	355	77.13
2	1.200	1.0954	354	77.08
1	1.100	1.0488	356	73.89
5	1.400	1.1832	357	83.41
4	1.200	1.0954	356	77.17
3	1.100	1.0488	352	73.71
2	1.100	1.0488	353	73.75
1	1.000	1.0000	351	70.23
5	1.300	1.1402	356	80.33
4	1.200	1.0954	352	76.99
3	1.000	1.0000	355	70.41
2	0.910	0.9539	354	67.12
1	0.920	0.9592	352	67.41
5	0.970	0.9849	355	69.34
4	0.910	0.9539	355	67.16
3	0.850	0.9220	354	64.87
2	0.980	0.9899	352	69.57
1	0.940	0.9695	353	68.18
5	1.200	1.0954	356	77.17
4	0.940	0.9695	357	68.35
3	0.860	0.9274	352	65.17
2	0.800	0.8944	352	62.86
1	0.810	0.9000	355	63.37
5	1.300	1.1402	358	80.42
4	0.970	0.9849	357	69.43
3	0.940	0.9695	354	68.22
2	0.960	0.9798	351	68.82
1	1.100	1.0488	353	73.75
Average	1.0609	1.0300	354.3	72.49

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.04	-0.02
Pre Test Span Direct	10.46	10.46	47.83	4.69
Pre-test Zero	0.02	0.05	0.07	0.01
Pre-test Span	10.42	10.40	47.38	4.71
0-30 min	12.69	5.37	37.52	0.16
Post Test Zero Direct	-0.01	0.05	0.04	-0.02
Post Test Span Direct	10.44	10.48	47.75	4.68
Post-test Zero	0.02	0.06	0.16	0.00
Post-test Span	10.42	10.43	47.42	4.70
Average	12.69	5.37	37.52	0.16
Corr. Results	12.77	5.37	37.42	0.15
	Cal Error <2%, Bias <5%; Drift <3%			
Calibrtion Error	-0.1%	-0.1%	0.6%	-0.5%
Pre-Test Zero Bias	0.1%	0.0%	0.0%	0.4%
Pre-Test Span Bias	-0.2%	-0.3%	-0.5%	0.2%
Post-Test Zero Bias	0.1%	0.1%	0.1%	0.2%
Post-Test Span Bias	-0.1%	-0.2%	-0.4%	0.1%
Zero Drift	0.0%	0.0%	0.1%	-0.2%
Span Drift	0.0%	0.2%	0.1%	-0.2%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	12.770	% dry
	11.479	% wet
CO_2:	5.372	% dry
	4.828	% wet
NO_x:	37.423	ppm dry
	33.638	ppm wet
	26.416	lb/hr
SO_2:	0.4592344	ppm dry
	0.451	lb/hr
CO:	0.15	ppm dry
	0.14	ppm wet
	0.065	lb/hr
H_2O:	10.1	%
MW:	28.22	lb/lb-mole
Flow:	168,937	wacfm
	98.54	mdscfm
	5912.62	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5912.62	3987.83	1924.79	32.6%
O_2	% dry	12.77	12.8	0.00	0.0%
CO_2	% dry	5.37	5.6	-0.20	-3.7%
NO_x	ppm dry	37.42	38.3	-0.88	-2.4%
NO_x	ppm @ 3% O_2	82.40	84.4	-1.96	-2.4%
NO_x	lb/hr	26.42	18.45	7.97	30.2%
SO_2	ppm dry	0.46	0.43	0.03	7.3%
SO_2	ppm @ 3% O_2	1.01	0.89	0.12	12.3%
SO_2	lb/hr	0.451	0.290	0.161	35.7%
CO	ppm dry	0.15	0.12	0.03	
CO	ppm @ 3% O_2	0.33	0.22	0.11	
CO	lb/hr	0.065	0.026		

SOx Titration Summary

	B1/2	Probe
N BaCl2	0.0096712	
Total VOL (ml)	366	
Aliquot VOL (ml)	20	
Titrant VOL (ml)	0.16	

Appendix B.3
Unit 2 Calculations

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	1-RA-U2
Date:	3/10/2020
Start Time:	7:00
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	871.8	746.8	125.0
2/H2O	690.3	689.4	0.9
3/Empty	609.0	609.1	-0.1
4/S.G.	1010.3	997.3	13.0
Rinse		50.0	-50.0
Total			88.8

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	606.630	77	78
		75	71
Stop	633.673	75	71
Total	27.043		74.5

Summary

Sample Volume:	26.915	dscf
H_2O Volume :	4.191	scf
Moisture Content:	13.5	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.200	1.0954	351	76.19
4	1.300	1.1402	352	79.35
3	1.100	1.0488	353	73.04
2	1.000	1.0000	353	69.64
1	1.100	1.0488	352	72.99
5	1.300	1.1402	351	79.30
4	1.100	1.0488	352	72.99
3	1.000	1.0000	353	69.64
2	1.200	1.0954	354	76.33
1	1.000	1.0000	351	69.55
5	1.300	1.1402	349	79.21
4	1.100	1.0488	350	72.90
3	0.830	0.9110	351	63.37
2	0.810	0.9000	352	62.64
1	0.780	0.8832	351	61.43
5	0.840	0.9165	348	63.63
4	0.800	0.8944	349	62.13
3	0.850	0.9220	350	64.09
2	0.810	0.9000	351	62.60
1	0.820	0.9055	352	63.02
5	0.980	0.9899	352	68.90
4	0.940	0.9695	353	67.52
3	0.860	0.9274	355	64.66
2	0.820	0.9055	356	63.18
1	0.610	0.7810	357	54.52
5	0.630	0.7937	351	55.21
4	0.590	0.7681	352	53.46
3	0.570	0.7550	353	52.58
2	0.550	0.7416	355	51.71
1	0.580	0.7616	351	52.97
Average	0.8982	0.9478	352.0	65.96

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Analyzer Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.04	0.01
Pre Test Span Direct	10.52	10.59	47.64	4.79
Pre-test Zero	0.03	0.07	0.36	0.02
Pre-test Span	10.52	10.50	47.48	4.76
0-30 min	9.58	11.02	35.40	0.08
Post Test Zero Direct	0.00	0.05	0.06	0.01
Post Test Span Direct	10.54	10.58	47.74	4.78
Post-test Zero	0.03	0.08	0.14	0.05
Post-test Span	10.53	10.54	47.46	4.76
Average	9.58	11.02	35.40	0.08
Corr. Results	9.54	10.98	35.21	0.05
Cal Error <2%, Bias <5%; Drift <3%				
Calibration Error	0.2%	0.6%	0.4%	0.6%
Pre-Test Zero Bias	0.2%	0.1%	0.4%	0.1%
Pre-Test Span Bias	0.0%	-0.5%	-0.2%	-0.4%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.4%
Post-Test Span Bias	0.0%	-0.2%	-0.3%	-0.2%
Zero Drift	0.0%	0.1%	-0.2%	0.3%
Span Drift	0.1%	0.2%	0.0%	0.1%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.536	% dry
CO_2:	10.976	% dry
NO_x:	35.209	ppm dry
	22.039	lb/hr
SO_2:	4.4695949	ppm dry
SO2:	3.892	lb/hr
CO:	0.05	ppm dry
	0.019	lb/hr
H_2O:	13.5	%
MW:	28.50	lb/lb-mole
Flow:	153,712	wacfm
	87.38	mdscfm
	5242.97	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5242.97	5329.60	-86.63	-1.7%
O_2	% dry	9.54	9.6	-0.08	-0.8%
CO_2	% dry	10.98	11.2	-0.21	-1.9%
NO_x	ppm dry	35.21	38.0	-2.76	-7.8%
NO_x	ppm @ 3% O_2	55.46	60.1	-4.61	-8.3%
NO_x	lb/hr	22.04	24.22	-2.18	-9.9%
SO_2	ppm dry	4.47	4.43	0.04	0.9%
SO_2	ppm @ 3% O_2	7.04	6.97	0.07	1.0%
SO_2	lb/hr	3.89	3.936	-0.043	-1.1%
CO	ppm dry	0.05	2.20	-2.14	
CO	ppm @ 3% O_2	0.08	3.48	-3.40	
CO	lb/hr	0.019	0.851		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	492
Aliquot VOL (ml)	20
Titrant VOL (ml)	1.19

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	2-RA-U2	
Date:	3/10/2020	
Start Time:	7:43	
Station:	Desert View Power	
Unit:	Unit 2	
Test Condition:	Full Load	
Performed By:	DW	

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	869.7	734.9	134.8
2/H2O	662.3	661.3	1.0
3/Empty	651.0	652.0	-1.0
4/S.G.	923.5	911.3	12.2
Rinse		50.0	-50.0
Total			97.0

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	634.600	73	70
		73	70
Stop	661.637	74	71
Total	27.037		71.8

Summary

Sample Volume:	27.044	dscf
H_2O Volume :	4.578	scf
Moisture Content:	14.5	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.200	1.0954	352	76.44
4	1.300	1.1402	353	79.61
3	1.000	1.0000	355	69.91
2	1.100	1.0488	354	73.27
1	1.100	1.0488	354	73.27
5	1.400	1.1832	353	82.61
4	1.100	1.0488	354	73.27
3	1.000	1.0000	355	69.91
2	1.100	1.0488	356	73.36
1	1.000	1.0000	355	69.91
5	1.200	1.0954	353	76.49
4	1.000	1.0000	352	69.78
3	0.860	0.9274	353	64.75
2	0.820	0.9055	354	63.27
1	0.800	0.8944	355	62.53
5	0.850	0.9220	355	64.45
4	0.810	0.9000	356	62.96
3	0.850	0.9220	357	64.53
2	0.820	0.9055	358	63.42
1	0.810	0.9000	355	62.92
5	1.000	1.0000	355	69.91
4	0.930	0.9644	356	67.46
3	0.820	0.9055	357	63.38
2	0.800	0.8944	355	62.53
1	0.630	0.7937	354	55.45
5	0.650	0.8062	353	56.29
4	0.610	0.7810	352	54.50
3	0.580	0.7616	353	53.17
2	0.550	0.7416	352	51.75
1	0.560	0.7483	351	52.19
Average	0.8951	0.9461	354.2	66.11

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Analyzer Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.06	0.01
Pre Test Span Direct	10.54	10.58	47.74	4.78
Pre-test Zero	0.03	0.08	0.14	0.05
Pre-test Span	10.53	10.54	47.46	4.76
0-30 min	9.75	10.78	35.89	0.09
Post Test Zero Direct	0.00	0.05	0.05	0.04
Post Test Span Direct	10.56	10.50	47.69	4.83
Post-test Zero	0.01	0.08	0.11	0.05
Post-test Span	10.51	10.50	47.39	4.80
Average	9.75	10.78	35.89	0.09
Corr. Results	9.71	10.74	35.76	0.05
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.3%	0.5%	0.5%	0.5%
Pre-Test Zero Bias	0.1%	0.2%	0.1%	0.4%
Pre-Test Span Bias	0.0%	-0.2%	-0.3%	-0.2%
Post-Test Zero Bias	0.0%	0.2%	0.1%	0.0%
Post-Test Span Bias	-0.2%	0.0%	-0.3%	-0.3%
Zero Drift	-0.1%	0.0%	0.0%	0.0%
Span Drift	-0.1%	-0.2%	-0.1%	0.4%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.711	% dry
CO_2:	10.741	% dry
NO_x:	35.762	ppm dry
	22.115	lb/hr
SO_2:	7.49206	ppm dry
	6.446	lb/hr
CO:	0.05	ppm dry
	0.017	lb/hr
H_2O:	14.5	%
MW:	28.35	lb/lb-mole
Flow:	154,063	wacfm
	86.33	mdscfm
	5179.72	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5179.72	5266.27	-86.55	-1.7%
O_2	% dry	9.71	9.8	-0.10	-1.0%
CO_2	% dry	10.74	11.0	-0.23	-2.2%
NO_x	ppm dry	35.76	38.7	-2.90	-8.1%
NO_x	ppm @ 3% O_2	57.21	62.2	-5.02	-8.8%
NO_x	lb/hr	22.11	24.4	-2.26	-10.2%
SO_2	ppm dry	7.49	8.09	-0.60	-8.0%
SO_2	ppm @ 3% O_2	11.99	13.03	-1.04	-8.7%
SO_2	lb/hr	6.446	7.086	-0.640	-9.9%
CO	ppm dry	0.05	1.91	-1.86	
CO	ppm @ 3% O_2	0.07	3.08	-3.01	
CO	lb/hr	0.017	0.730		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	519
Aliquot VOL (ml)	20
Titrant VOL (ml)	1.90

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	3-RA-U2
Date:	3/10/2020
Start Time:	8:25
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	877.0	750.0	127.0
2/H2O	675.7	674.2	1.5
3/Empty	610.3	610.2	0.1
4/S.G.	1015.6	1010.3	5.3
Rinse		50.0	-50.0
Total			83.9

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	663.500	74	73
		76	73
Stop	690.524	77	75
Total	27.024		74.7

Summary

Sample Volume:	26.888	dscf
H_2O Volume :	3.960	scf
Moisture Content:	12.8	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.300	1.1402	353	79.32
4	1.200	1.0954	353	76.21
3	1.000	1.0000	352	69.53
2	1.100	1.0488	352	72.92
1	1.100	1.0488	352	72.92
5	1.300	1.1402	351	79.23
4	1.200	1.0954	352	76.17
3	1.000	1.0000	352	69.53
2	1.100	1.0488	351	72.88
1	1.100	1.0488	352	72.92
5	1.200	1.0954	350	76.07
4	1.100	1.0488	349	72.79
3	1.000	1.0000	350	69.44
2	0.970	0.9849	352	68.48
1	0.810	0.9000	351	62.54
5	1.100	1.0488	350	72.83
4	1.000	1.0000	348	69.36
3	1.000	1.0000	348	69.36
2	0.940	0.9695	349	67.29
1	0.830	0.9110	348	63.19
5	1.000	1.0000	350	69.44
4	0.910	0.9539	352	66.33
3	0.820	0.9055	352	62.96
2	0.850	0.9220	353	64.14
1	0.670	0.8185	352	56.91
5	0.660	0.8124	353	56.52
4	0.570	0.7550	352	52.49
3	0.540	0.7348	351	51.06
2	0.590	0.7681	352	53.41
1	0.610	0.7810	352	54.30
Average	0.9394	0.9692	351.1	67.35

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.05	0.04
Pre Test Span Direct	10.56	10.50	47.69	4.83
Pre-test Zero	0.01	0.08	0.11	0.05
Pre-test Span	10.51	10.50	47.39	4.80
0-30 min	9.73	10.77	37.70	0.11
Post Test Zero Direct	0.00	0.05	0.05	0.02
Post Test Span Direct	10.54	10.49	47.69	4.80
Post-test Zero	0.02	0.08	0.10	0.04
Post-test Span	10.52	10.44	47.39	4.78
Average	9.73	10.77	37.70	0.11
Corr. Results	9.70	10.78	37.61	0.07
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.4%	0.1%	0.4%	1.0%
Pre-Test Zero Bias	0.0%	0.2%	0.1%	0.0%
Pre-Test Span Bias	-0.2%	0.0%	-0.3%	-0.3%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Post-Test Span Bias	-0.1%	-0.2%	-0.3%	-0.2%
Zero Drift	0.0%	0.0%	0.0%	-0.1%
Span Drift	0.0%	-0.3%	0.0%	-0.2%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.696	% dry
CO_2:	10.781	% dry
NO_x:	37.611	ppm dry
	24.242	lb/hr
SO_2:	10.241031	ppm dry
	9.184	lb/hr
CO:	0.07	ppm dry
	0.027	lb/hr
H_2O:	12.8	%
MW:	28.56	lb/lb-mole
Flow:	156,958	wacfm
	89.98	mdscfm
	5398.86	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5398.86	5257.13	141.73	2.6%
O_2	% dry	9.70	9.8	-0.08	-0.8%
CO_2	% dry	10.78	11.0	-0.25	-2.3%
NO_x	ppm dry	37.61	40.4	-2.75	-7.3%
NO_x	ppm @ 3% O_2	60.09	64.6	-4.50	-7.5%
NO_x	lb/hr	24.24	25.4480	-1.21	-5.0%
SO_2	ppm dry	10.24	11.30	-1.06	-10.4%
SO_2	ppm @ 3% O_2	16.36	17.96	-1.60	-9.8%
SO_2	lb/hr	9.184	9.942	-0.758	-8.3%
CO	ppm dry	0.07	1.97	-1.90	
CO	ppm @ 3% O_2	0.11	3.17	-3.06	
CO	lb/hr	0.027	0.754	-0.73	

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	393
Aliquot VOL (ml)	20
Titrant VOL (ml)	3.41

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	4-RA-U2
Date:	3/10/2020
Start Time:	9:08
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	855.8	730.0	125.8
2/H2O	646.9	644.1	2.8
3/Empty	652.5	651.3	1.2
4/S.G.	927.5	923.5	4.0
Rinse		50.0	-50.0
Total			83.8

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	692.000	78	74
		75	73
Stop	718.968	78	75
Total	26.968		75.5

Summary

Sample Volume:	26.791	dscf
H_2O Volume :	3.955	scf
Moisture Content:	12.9	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.300	1.1402	354	79.34
4	1.100	1.0488	355	73.03
3	1.000	1.0000	356	69.67
2	1.100	1.0488	355	73.03
1	1.200	1.0954	354	76.23
5	1.400	1.1832	355	82.39
4	1.200	1.0954	358	76.42
3	1.200	1.0954	358	76.42
2	1.000	1.0000	357	69.72
1	1.100	1.0488	356	73.07
5	1.300	1.1402	355	79.39
4	1.100	1.0488	356	73.07
3	0.850	0.9220	357	64.27
2	0.960	0.9798	358	68.35
1	0.820	0.9055	355	63.05
5	0.850	0.9220	354	64.16
4	0.860	0.9274	356	64.61
3	0.830	0.9110	357	63.51
2	0.880	0.9381	355	65.32
1	0.940	0.9695	354	67.47
5	1.100	1.0488	350	72.80
4	1.000	1.0000	352	69.50
3	0.880	0.9381	351	65.16
2	0.850	0.9220	353	64.12
1	0.660	0.8124	354	56.53
5	0.690	0.8307	355	57.84
4	0.630	0.7937	356	55.30
3	0.570	0.7550	357	52.63
2	0.550	0.7416	358	51.73
1	0.580	0.7616	356	53.06
Average	0.9360	0.9675	355.2	67.37

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.05	0.02
Pre Test Span Direct	10.54	10.49	47.69	4.80
Pre-test Zero	0.02	0.08	0.10	0.04
Pre-test Span	10.52	10.44	47.39	4.78
0-30 min	9.50	10.98	40.05	0.11
Post Test Zero Direct	0.00	0.05	0.05	0.03
Post Test Span Direct	10.56	10.47	47.70	4.84
Post-test Zero	0.01	0.08	0.11	0.06
Post-test Span	10.54	10.44	47.31	4.81
Average	9.50	10.98	40.05	0.11
Corr. Results	9.45	11.03	39.99	0.06
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.3%	0.0%	0.4%	0.7%
Pre-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Pre-Test Span Bias	-0.1%	-0.2%	-0.3%	-0.2%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Post-Test Span Bias	-0.1%	-0.2%	-0.4%	-0.3%
Zero Drift	0.0%	0.0%	0.0%	0.2%
Span Drift	0.1%	0.0%	-0.1%	0.3%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.455	% dry
CO_2:	11.026	% dry
NO_x:	39.987	ppm dry
	25.645	lb/hr
SO_2:	11.476823	ppm dry
	10.240	lb/hr
CO:	0.06	ppm dry
	0.024	lb/hr
H_2O:	12.9	%
MW:	28.58	lb/lb-mole
Flow:	157,009	wacfm
	89.53	mdscfm
	5371.76	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5371.76	5284.03	87.73	1.6%
O_2	% dry	9.45	9.5	-0.08	-0.8%
CO_2	% dry	11.03	11.3	-0.26	-2.4%
NO_x	ppm dry	39.99	42.8	-2.82	-7.1%
NO_x	ppm @ 3% O_2	62.54	67.2	-4.63	-7.4%
NO_x	lb/hr	25.64	27.1007	-1.46	-5.7%
SO_2	ppm dry	11.48	12.41	-0.94	-8.2%
SO_2	ppm @ 3% O_2	17.95	19.39	-1.44	-8.0%
SO_2	lb/hr	10.240	10.960	-0.719	-7.0%
CO	ppm dry	0.06	1.52	-1.46	
CO	ppm @ 3% O_2	0.10	2.40	-2.30	
CO	lb/hr	0.024	0.585		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	435
Aliquot VOL (ml)	20
Titrant VOL (ml)	3.44

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	5-RA-U2
Date:	3/10/2020
Start Time:	9:50
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	788.8	667.8	121.0
2/H2O	721.7	720.0	1.7
3/Empty	607.9	607.6	0.3
4/S.G.	1025.1	1015.6	9.5
Rinse		50.0	-50.0
Total			82.5

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	720.200	76	75
		78	75
Stop	747.188	76	75
Total	26.988		75.8

Summary

Sample Volume:	26.794	dscf
H_2O Volume :	3.894	scf
Moisture Content:	12.7	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.400	1.1832	345	81.80
4	1.200	1.0954	349	75.92
3	1.000	1.0000	350	69.35
2	1.000	1.0000	351	69.39
1	1.100	1.0488	350	72.74
5	1.300	1.1402	352	79.17
4	1.100	1.0488	352	72.83
3	1.000	1.0000	351	69.39
2	1.100	1.0488	350	72.74
1	1.200	1.0954	350	75.97
5	1.400	1.1832	355	82.31
4	1.200	1.0954	356	76.25
3	0.980	0.9899	357	68.95
2	0.930	0.9644	355	67.09
1	0.840	0.9165	354	63.72
5	0.960	0.9798	355	68.16
4	0.900	0.9487	354	65.95
3	0.870	0.9327	353	64.81
2	0.880	0.9381	354	65.22
1	0.900	0.9487	355	66.00
5	1.200	1.0954	352	76.06
4	1.000	1.0000	353	69.48
3	0.910	0.9539	354	66.32
2	0.840	0.9165	355	63.76
1	0.620	0.7874	352	54.67
5	0.730	0.8544	351	59.29
4	0.610	0.7810	353	54.27
3	0.550	0.7416	352	51.50
2	0.520	0.7211	355	50.16
1	0.560	0.7483	352	51.96
Average	0.9447	0.9719	352.6	67.51

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.05	0.03
Pre Test Span Direct	10.56	10.47	47.70	4.84
Pre-test Zero	0.00	0.05	0.05	0.03
Pre-test Span	10.56	10.47	47.70	4.84
0-30 min	9.23	11.30	40.40	0.09
Post Test Zero Direct	-0.01	0.05	0.05	0.01
Post Test Span Direct	10.54	10.48	47.72	4.80
Post-test Zero	0.02	0.09	0.12	0.03
Post-test Span	10.51	10.44	47.36	4.74
Average	9.23	11.30	40.40	0.09
Corr. Results	9.18	11.33	40.19	0.05
Cal Error <2%, Bias <5%; Drift <3%				
Calibration Error	0.4%	0.0%	0.4%	1.0%
Pre-Test Zero Bias	0.0%	0.0%	0.0%	0.0%
Pre-Test Span Bias	0.0%	0.0%	0.0%	0.0%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Post-Test Span Bias	-0.1%	-0.2%	-0.4%	-0.6%
Zero Drift	0.1%	0.2%	0.1%	0.0%
Span Drift	-0.3%	-0.2%	-0.4%	-1.0%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.179	% dry
CO_2:	11.327	% dry
NO_x:	40.195	ppm dry
	25.966	lb/hr
SO_2:	7.6004579	ppm dry
	6.831	lb/hr
CO:	0.05	ppm dry
	0.021	lb/hr
H_2O:	12.7	%
MW:	28.63	lb/lb-mole
Flow:	157,321	wacfm
	90.18	mdscfm
	5410.99	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5410.99	5192.90	218.09	4.0%
O_2	% dry	9.18	9.3	-0.12	-1.3%
CO_2	% dry	11.33	11.6	-0.24	-2.1%
NO_x	ppm dry	40.19	42.8	-2.61	-6.5%
NO_x	ppm @ 3% O_2	61.38	65.7	-4.30	-7.0%
NO_x	lb/hr	25.97	26.6867	-0.72	-2.8%
SO_2	ppm dry	7.60	8.45	-0.85	-11.2%
SO_2	ppm @ 3% O_2	11.61	12.80	-1.19	-10.2%
SO_2	lb/hr	6.831	7.402	-0.571	-8.4%
CO	ppm dry	0.05	1.02	-0.96	
CO	ppm @ 3% O_2	0.08	1.56	-1.48	
CO	lb/hr	0.021	0.385	-0.36	

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	374
Aliquot VOL (ml)	20
Titrant VOL (ml)	2.65

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	6-RA-U2
Date:	3/10/2020
Start Time:	10:37
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	852.3	730.2	122.1
2/H2O	651.4	649.9	1.5
3/Empty	650.3	650.0	0.3
4/S.G.	937.7	927.5	10.2
Rinse		50.0	-50.0
Total			84.1

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	748.500	76	75
		76	74
Stop	775.203	77	75
Total	26.703		75.5

Summary

Sample Volume:	26.527	dscf
H_2O Volume :	3.970	scf
Moisture Content:	13.0	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.300	1.1402	346	79.00
4	1.100	1.0488	349	72.81
3	1.200	1.0954	350	76.09
2	1.000	1.0000	351	69.50
1	1.000	1.0000	351	69.50
5	1.200	1.0954	352	76.19
4	1.300	1.1402	352	79.30
3	1.100	1.0488	353	72.99
2	1.100	1.0488	353	72.99
1	1.000	1.0000	351	69.50
5	1.300	1.1402	352	79.30
4	1.100	1.0488	353	72.99
3	1.000	1.0000	354	69.63
2	0.960	0.9798	353	68.18
1	0.800	0.8944	352	62.21
5	0.940	0.9695	351	67.39
4	0.920	0.9592	353	66.75
3	0.860	0.9274	354	64.58
2	0.870	0.9327	355	64.99
1	0.890	0.9434	352	65.61
5	1.200	1.0954	353	76.23
4	1.100	1.0488	354	73.03
3	0.930	0.9644	355	67.19
2	0.820	0.9055	355	63.09
1	0.600	0.7746	352	53.87
5	0.720	0.8485	353	59.05
4	0.640	0.8000	354	55.71
3	0.550	0.7416	353	51.61
2	0.530	0.7280	352	50.63
1	0.550	0.7416	350	51.51
Average	0.9384	0.9687	352.3	67.38

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	-0.01	0.05	0.05	0.01
Pre Test Span Direct	10.54	10.48	47.72	4.80
Pre-test Zero	0.02	0.09	0.12	0.03
Pre-test Span	10.51	10.44	47.36	4.74
0-30 min	9.71	10.78	35.15	0.11
Post Test Zero Direct	0.00	0.05	0.05	0.06
Post Test Span Direct	10.57	10.46	47.68	4.83
Post-test Zero	0.03	0.08	0.11	0.07
Post-test Span	10.54	10.41	47.25	4.84
Average	9.71	10.78	35.15	0.11
Corr. Results	9.67	10.84	35.12	0.05
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.3%	0.0%	0.5%	0.6%
Pre-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Pre-Test Span Bias	-0.1%	-0.2%	-0.4%	-0.6%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Post-Test Span Bias	-0.2%	-0.2%	-0.5%	0.1%
Zero Drift	0.0%	0.0%	0.0%	0.4%
Span Drift	0.1%	-0.1%	-0.1%	1.0%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.670	% dry
CO_2:	10.836	% dry
NO_x:	35.117	ppm dry
	22.567	lb/hr
SO_2:	3.4558375	ppm dry
	3.090	lb/hr
CO:	0.05	ppm dry
	0.021	lb/hr
H_2O:	13.0	%
MW:	28.54	lb/lb-mole
Flow:	157,026	wacfm
	89.71	mdscfm
	5382.58	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5382.58	4942.60	439.98	8.2%
O_2	% dry	9.67	9.7	-0.04	-0.5%
CO_2	% dry	10.84	11.1	-0.25	-2.3%
NO_x	ppm dry	35.12	38.2	-3.07	-8.8%
NO_x	ppm @ 3% O_2	55.98	60.7	-4.77	-8.5%
NO_x	lb/hr	22.57	22.6403	-0.07	-0.3%
SO_2	ppm dry	3.46	3.66	-0.20	-5.8%
SO_2	ppm @ 3% O_2	5.51	5.80	-0.29	-5.2%
SO_2	lb/hr	3.090	3.015	0.075	2.4%
CO	ppm dry	0.05	1.27	-1.22	
CO	ppm @ 3% O_2	0.09	2.03	-1.95	
CO	lb/hr	0.021	0.443		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	507
Aliquot VOL (ml)	20
Titrant VOL (ml)	0.88

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	7-RA-U2	
Date:	3/10/2020	
Start Time:	11:21	
Station:	Desert View Power	
Unit:	Unit 2	
Test Condition:	Full Load	
Performed By:	DW	

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	807.8	685.6	122.2
2/H2O	755.3	753.4	1.9
3/Empty	607.4	607.5	-0.1
4/S.G.	1033.7	1025.1	8.6
Rinse		50.0	-50.0
Total			82.6

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	776.300	78	76
		79	77
Stop	803.382	79	78
Total	27.082		77.8

Summary

Sample Volume:	26.787	dscf
H_2O Volume :	3.899	scf
Moisture Content:	12.7	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.400	1.1832	351	82.16
4	1.000	1.0000	352	69.48
3	1.200	1.0954	353	76.16
2	1.100	1.0488	352	72.87
1	1.000	1.0000	351	69.44
5	1.300	1.1402	353	79.27
4	1.100	1.0488	354	72.96
3	1.200	1.0954	355	76.25
2	1.100	1.0488	353	72.92
1	1.000	1.0000	352	69.48
5	1.300	1.1402	353	79.27
4	1.200	1.0954	354	76.21
3	1.000	1.0000	355	69.61
2	0.960	0.9798	356	68.25
1	0.790	0.8888	352	61.76
5	0.930	0.9644	353	67.05
4	0.870	0.9327	354	64.89
3	0.850	0.9220	355	64.18
2	0.810	0.9000	356	62.69
1	0.880	0.9381	357	65.38
5	1.200	1.0954	352	76.11
4	1.000	1.0000	353	69.52
3	0.940	0.9695	354	67.45
2	0.860	0.9274	355	64.55
1	0.620	0.7874	356	54.84
5	0.710	0.8426	357	58.73
4	0.660	0.8124	355	56.55
3	0.570	0.7550	356	52.59
2	0.520	0.7211	355	50.20
1	0.540	0.7348	354	51.12
Average	0.9388	0.9689	353.9	67.40

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.05	0.06
Pre Test Span Direct	10.57	10.46	47.68	4.83
Pre-test Zero	0.03	0.08	0.11	0.07
Pre-test Span	10.54	10.41	47.25	4.84
0-30 min	9.53	10.94	42.80	0.11
Post Test Zero Direct	0.00	0.05	0.04	0.02
Post Test Span Direct	10.52	10.48	47.58	4.76
Post-test Zero	0.02	0.08	0.09	0.04
Post-test Span	10.51	10.44	47.42	4.75
Average	9.53	10.94	42.80	0.11
Corr. Results	9.49	11.00	42.76	0.05
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.5%	-0.1%	0.4%	0.9%
Pre-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Pre-Test Span Bias	-0.2%	-0.2%	-0.5%	0.1%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Post-Test Span Bias	-0.1%	-0.2%	-0.2%	-0.1%
Zero Drift	0.0%	0.0%	0.0%	-0.3%
Span Drift	-0.2%	0.1%	0.2%	-0.9%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.487	% dry
CO_2:	11.000	% dry
NO_x:	42.758	ppm dry
	27.525	lb/hr
SO_2:	9.1606331	ppm dry
	8.205	lb/hr
CO:	0.05	ppm dry
	0.020	lb/hr
H_2O:	12.7	%
MW:	28.60	lb/lb-mole
Flow:	157,065	wacfm
	89.87	mdscfm
	5392.12	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5392.12	4811.33	580.79	10.8%
O_2	% dry	9.49	9.5	-0.05	-0.5%
CO_2	% dry	11.00	11.2	-0.21	-1.9%
NO_x	ppm dry	42.76	45.6	-2.80	-6.5%
NO_x	ppm @ 3% O_2	67.06	71.4	-4.31	-6.4%
NO_x	lb/hr	27.53	26.3083	1.22	4.4%
SO_2	ppm dry	9.16	10.51	-1.35	-14.7%
SO_2	ppm @ 3% O_2	14.37	16.42	-2.06	-14.3%
SO_2	lb/hr	8.205	8.453	-0.248	-3.0%
CO	ppm dry	0.05	1.62	-1.57	
CO	ppm @ 3% O_2	0.08	2.55	-2.47	
CO	lb/hr	0.020	0.567		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	425
Aliquot VOL (ml)	20
Titrant VOL (ml)	2.81

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	8-RA-U2
Date:	3/10/2020
Start Time:	12:06
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	859.7	735.5	124.2
2/H2O	650.6	648.7	1.9
3/Empty	652.3	651.3	1.0
4/S.G.	940.0	937.7	2.3
Rinse		50.0	-50.0
Total			79.4

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	804.500	79	77
		78	76
Stop	831.934	78	76
Total	27.434		77.3

Summary

Sample Volume:	27.161	dscf
H_2O Volume :	3.748	scf
Moisture Content:	12.1	%

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	0.00	0.05	0.04	0.02
Pre Test Span Direct	10.52	10.48	47.58	4.76
Pre-test Zero	0.02	0.08	0.09	0.04
Pre-test Span	10.51	10.44	47.42	4.75
0-30 min	9.62	10.82	42.48	0.10
Post Test Zero Direct	-0.01	0.05	0.06	0.06
Post Test Span Direct	10.53	10.49	47.66	4.75
Post-test Zero	0.02	0.08	0.09	0.03
Post-test Span	10.50	10.42	47.47	4.75
Average	9.62	10.82	42.48	0.10
Corr. Results	9.59	10.87	42.34	0.06
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.2%	0.0%	0.3%	0.2%
Pre-Test Zero Bias	0.1%	0.2%	0.1%	0.2%
Pre-Test Span Bias	-0.1%	-0.2%	-0.2%	-0.1%
Post-Test Zero Bias	0.2%	0.2%	0.0%	-0.2%
Post-Test Span Bias	-0.1%	-0.3%	-0.2%	0.0%
Zero Drift	0.0%	0.0%	0.0%	-0.1%
Span Drift	0.0%	-0.1%	0.1%	0.0%
CAL STATUS	PASS	PASS	PASS	PASS

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.200	1.0954	352	76.04
4	1.200	1.0954	352	76.04
3	1.100	1.0488	352	72.80
2	1.000	1.0000	351	69.37
1	1.100	1.0488	350	72.71
5	1.300	1.1402	353	79.19
4	1.200	1.0954	353	76.09
3	1.100	1.0488	354	72.89
2	1.000	1.0000	355	69.54
1	1.100	1.0488	352	72.80
5	1.200	1.0954	352	76.04
4	1.300	1.1402	354	79.24
3	1.100	1.0488	354	72.89
2	0.940	0.9695	355	67.42
1	0.820	0.9055	352	62.86
5	0.970	0.9849	353	68.41
4	0.850	0.9220	352	64.00
3	0.840	0.9165	354	63.70
2	0.850	0.9220	355	64.11
1	0.840	0.9165	355	63.74
5	1.100	1.0488	354	72.89
4	1.000	1.0000	354	69.50
3	0.960	0.9798	356	68.18
2	0.880	0.9381	354	65.20
1	0.600	0.7746	355	53.87
5	0.770	0.8775	358	61.13
4	0.680	0.8246	355	57.35
3	0.520	0.7211	355	50.15
2	0.490	0.7000	354	48.65
1	0.530	0.7280	353	50.56
Average	0.9367	0.9679	353.6	67.24

TEST SUMMARY

O_2:	9.594	% dry
CO_2:	10.875	% dry
NO_x:	42.343	ppm dry
	27.388	lb/hr
SO_2:	10.281577	ppm dry
	9.253	lb/hr
CO:	0.06	ppm dry
	0.024	lb/hr
H_2O:	12.1	%
MW:	28.65	lb/lb-mole
Flow:	156,708	wacfm
	90.30	mdscfm
	5417.81	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5417.81	4599.27	818.55	15.1%
O_2	% dry	9.59	9.7	-0.09	-0.9%
CO_2	% dry	10.87	11.1	-0.21	-1.9%
NO_x	ppm dry	42.34	45.1	-2.74	-6.5%
NO_x	ppm @ 3% O_2	67.04	71.6	-4.58	-6.8%
NO_x	lb/hr	27.39	24.9053	2.48	9.1%
SO_2	ppm dry	10.28	11.63	-1.35	-13.2%
SO_2	ppm @ 3% O_2	16.28	18.37	-2.09	-12.9%
SO_2	lb/hr	9.253	8.984	0.268	2.9%
CO	ppm dry	0.06	1.13	-1.07	
CO	ppm @ 3% O_2	0.10	1.80	-1.71	
CO	lb/hr	0.024	0.381		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	437
Aliquot VOL (ml)	20
Titrant VOL (ml)	3.11

MONTROSE AQS
RELATIVE ACCURACY TEST AUDIT
DATA AND WORKSHEET
Desert View Power UNIT 2

PRE-TEST INFORMATION
GENERAL

Test:	9-RA-U2
Date:	3/10/2020
Start Time:	12:50
Station:	Desert View Power
Unit:	Unit 2
Test Condition:	Full Load
Performed By:	DW

PRE-TEST INFORMATION
SAMPLE TRAIN

Barom. Pressure:		psi
	30.21	"Hg
Meter No.	17-WCS	
Meter Y_d:	0.9920	
Meter Pressure:	2.5	iwg
Pstack:	0.33	iwg
Pstack:	30.23	"Hg
Cp:	0.84	
Tref:	68	°F
Stack Area:	38.84	ft^2

METHOD 4 DATA
Impingers

#/Matl.	End	Start	Diff.
1/H2O	892.8	760.2	132.6
2/H2O	673.7	672.9	0.8
3/Empty	607.3	606.6	0.7
4/S.G.	1044.3	1033.7	10.6
Rinse		50.0	-50.0
Total			94.7

Dry Gas Meter

Time	Vol.	Tm(in)	Tm(out)
Start	833.100	78	76
		77	74
Stop	859.971	74	72
Total	26.871		75.2

Summary

Sample Volume:	26.711	dscf
H_2O Volume :	4.470	scf
Moisture Content:	14.3	%

METHOD 2 DATA

Point	dP (in. H_2O)	dP^2 (in. H_2O^2)	Temp (°F)	Velocity (fps)
5	1.200	1.0954	354	76.48
4	1.300	1.1402	353	79.56
3	1.000	1.0000	352	69.73
2	1.100	1.0488	351	73.09
1	1.000	1.0000	352	69.73
5	1.200	1.0954	354	76.48
4	1.100	1.0488	353	73.18
3	1.200	1.0954	351	76.34
2	1.200	1.0954	352	76.39
1	1.000	1.0000	351	69.69
5	1.200	1.0954	349	76.25
4	1.200	1.0954	350	76.29
3	1.100	1.0488	354	73.23
2	0.940	0.9695	353	67.65
1	0.820	0.9055	353	63.18
5	1.000	1.0000	356	69.90
4	0.860	0.9274	355	64.79
3	0.820	0.9055	355	63.26
2	0.870	0.9327	353	65.08
1	0.850	0.9220	352	64.29
5	1.200	1.0954	352	76.39
4	1.000	1.0000	351	69.69
3	0.900	0.9487	354	66.24
2	0.840	0.9165	353	63.95
1	0.630	0.7937	353	55.38
5	0.760	0.8718	356	60.94
4	0.680	0.8246	357	57.68
3	0.530	0.7280	357	50.92
2	0.550	0.7416	355	51.81
1	0.570	0.7550	354	52.71
Average	0.9407	0.9699	353.2	67.68

METHOD 3A, 6C, 7E DATA

	O_2	CO_2	NO_x	CO
Span	19.15	18.94	90.40	9.65
Actual Span Value	10.48	10.48	47.3	4.74
Pre Test Zero Direct	-0.01	0.05	0.06	0.06
Pre Test Span Direct	10.53	10.49	47.66	4.75
Pre-test Zero	0.02	0.08	0.09	0.03
Pre-test Span	10.50	10.42	47.47	4.75
0-30 min	9.57	10.87	49.91	0.30
Post Test Zero Direct	-0.01	0.05	0.04	0.01
Post Test Span Direct	10.51	10.50	47.84	4.75
Post-test Zero	0.01	0.09	0.12	0.03
Post-test Span	10.48	10.44	47.45	4.72
Average	9.57	10.87	49.91	0.30
Corr. Results	9.56	10.93	49.74	0.27
Cal Error <2%, Bias <5%; Drift <3%				
Calibrtion Error	0.2%	0.0%	0.4%	0.1%
Pre-Test Zero Bias	0.2%	0.2%	0.0%	-0.2%
Pre-Test Span Bias	-0.1%	-0.3%	-0.2%	0.0%
Post-Test Zero Bias	0.1%	0.2%	0.1%	0.3%
Post-Test Span Bias	-0.2%	-0.3%	-0.4%	-0.4%
Zero Drift	-0.1%	0.0%	0.0%	0.0%
Span Drift	-0.1%	0.1%	0.0%	-0.3%
CAL STATUS	PASS	PASS	PASS	PASS

TEST SUMMARY

O_2:	9.560	% dry
CO_2:	10.927	% dry
NO_x:	49.741	ppm dry
	31.583	lb/hr
SO_2:	11.152458	ppm dry
	9.852	lb/hr
CO:	0.27	ppm dry
	0.103	lb/hr
H_2O:	14.3	%
MW:	28.39	lb/lb-mole
Flow:	157,716	wacfm
	88.64	mdscfm
	5318.37	kdscfh

RELATIVE ACCURACY DATA

Parameter	Units	Ref. Meth	CEMS	Diff.	Diff. %
Flow	kdscfh	5318.37	4285.47	1032.90	19.4%
O_2	% dry	9.56	9.6	-0.05	-0.6%
CO_2	% dry	10.93	11.2	-0.23	-2.1%
NO_x	ppm dry	49.74	52.7	-2.94	-5.9%
NO_x	ppm @ 3% O_2	78.52	83.3	-4.78	-6.1%
NO_x	lb/hr	31.58	27.15	4.44	14.0%
SO_2	ppm dry	11.15	12.72	-1.56	-14.0%
SO_2	ppm @ 3% O_2	17.60	18.20	-0.60	-3.4%
SO_2	lb/hr	9.852	9.701	0.151	1.5%
CO	ppm dry	0.27	1 00	-0.74	
CO	ppm @ 3% O_2	0.42	1.52	-1.10	
CO	lb/hr	0.103	0.333		

SOx Titration Summary

	B1/2
N BaCl2	0.0096805
Total VOL (ml)	438
Aliquot VOL (ml)	20
Titrant VOL (ml)	3.31

APPENDIX C
QUALITY ASSURANCE

Appendix C.1
Quality Assurance Program Summary

QUALITY ASSURANCE PROGRAM SUMMARY

As part of Montrose Air Quality Services, LLC (MAQS) ASTM D7036-04 certification, MAQS is committed to providing emission related data which is complete, precise, accurate, representative, and comparable. MAQS quality assurance program and procedures are designed to ensure that the data meet or exceed the requirements of each test method for each of these items. The quality assurance program consists of the following items:

- Assignment of an Internal QA Officer
- Development and use of an internal QA Manual
- Personnel training
- Equipment maintenance and calibration
- Knowledge of current test methods
- Chain-of-custody
- QA reviews of test programs

Assignment of an Internal QA Officer: MAQS has assigned an internal QA Officer who is responsible for administering all aspects of the QA program.

Internal Quality Assurance Manual: MAQS has prepared a QA Manual according to the requirements of ASTM D7036-04 and guidelines issued by EPA. The manual documents and formalizes all of MAQS QA efforts. The manual is revised upon periodic review and as MAQS adds capabilities. The QA manual provides details on the items provided in this summary.

Personnel Testing and Training: Personnel testing and training is essential to the production of high quality test results. MAQS training programs include:

- A requirement for all technical personnel to read and understand the test methods performed
- A requirement for all technical personnel to read and understand the MAQS QA manual
- In-house testing and training
- Quality Assurance meetings
- Third party testing where available
- Maintenance of training records.

Equipment Maintenance and Calibration: All laboratory and field equipment used as a part of MAQS emission measurement programs is maintained according to manufacturer's recommendations. A summary of the major equipment maintenance schedules is summarized in Table 1. In addition to routine maintenance, calibrations are performed on all sampling equipment according to the procedures outlined in the applicable test method. The calibration intervals and techniques for major equipment components is summarized in Table 2. The calibration technique may vary to meet regulatory agency requirements.

Knowledge of Current Test Methods: MAQS maintains current copies of EPA, ARB, and SCAQMD Source Test Manuals and Rules and Regulations.

Chain-of-Custody: MAQS maintains chain-of-custody documentation on all data sheets and samples. Samples are stored in a locked area accessible only to MAQS source test personnel. Data sheets are kept in the custody of the originator, program manager, or in locked storage until return to MAQS office. Electronic field data is duplicated for backup on secure storage media. The original data sheets are used for report preparation and any additions are initialed and dated.

QA Reviews: Periodic field, laboratory, and report reviews are performed by the in-house QA coordinator. Periodically, test plans are reviewed to ensure proper test methods are selected and reports are reviewed to ensure that the methods were followed and any deviations from the methods are justified and documented.

ASTM D7036-04 Required Information

Uncertainty Statement

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is presented in the report appendices.

Performance Data

Performance data are available for review.

Qualified Personnel

A qualified individual (QI), defined by performance on a third party or internal test on the test methods, will be present on each test event.

Plant Entry and Safety Requirements

Plant Entry

All test personnel are required to check in with the guard at the entrance gate or other designated area. Specific details are provided by the facility and project manager.

Safety Requirements

All personnel shall have the following Personal Protective Equipment (PPE) and wear them where designated:

- Hard Hat
- Safety Glasses
- Steel Toe Boots
- Hearing Protection
- Gloves
- High Temperature Gloves (if required)

The following safety measures will be followed:

- Good housekeeping
- SDS for all on-site hazardous materials
- Confine selves to necessary areas (stack platform, mobile laboratory, CEMS data acquisition system, control room, administrative areas)
- Knowledge of evacuation procedures

Each facility will provide plant specific safety training.

TABLE 1
EQUIPMENT MAINTENANCE SCHEDULE

Equipment	Acceptance Limits	Frequency of Service	Methods of Service
Pumps	1. Absence of leaks 2. Ability to draw manufacturers required vacuum and flow	As recommended by manufacturer	1. Visual inspection 2. Clean 3. Replace parts 4. Leak check
Flow Meters	1. Free mechanical movement	As recommended by manufacturer	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero span gas	As recommended by manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	1. Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobile Van Sampling System	1. Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Lines	1. Sample degradation less than 2%	After each test series	1. Blow dry, inert gas through line until dry

TABLE 2
MAJOR SAMPLING EQUIPMENT CALIBRATION REQUIREMENTS

Sampling Equipment	Calibration Frequency	Calibration Procedure	Acceptable Calibration Criteria
Continuous Analyzers	Before and After Each Test Day	3-point calibration error test	< 2% of analyzer range
Continuous Analyzers	Before and After Each Test Run	2-point sample system bias check	< 5% of analyzer range
Continuous Analyzers	After Each Test Run	2-point analyzer drift determination	< 3% of analyzer range
CEMS System	Beginning of Each Day	leak check	< 1 in. Hg decrease in 5 min. at > 20 in. Hg
Continuous Analyzers	Semi-Annually	3-point linearity	< 1% of analyzer range
NO_x Analyzer	Daily	NO_2 -> NO converter efficiency	> 90%
Differential Pressure Gauges (except for manometers)	Semi-Annually	Correction factor based on 5-point comparison to standard	+/- 5%
Differential Pressure Gauges (except for manometers)	Bi-Monthly	3-point comparison to standard, no correction factor	+/- 5%
Barometer	Semi-Annually	Adjusted to mercury-in-glass or National Weather Service Station	+/- 0.1 inches Hg
Dry Gas Meter	Semi-Annually	Calibration check at 4 flow rates using a NIST traceable standard	+/- 2%
Dry Gas Meter	Bi-Monthly	Calibration check at 2 flow rates using a NIST traceable standard	+/- 2% of semi-annual factor
Dry Gas Meter Orifice	Annually	4-point calibration for ΔH@	--
Temperature Sensors	Semi-Annually	3-point calibration vs. NIST traceable standard	+/- 1.5%

Note: Calibration requirements will be used that meet applicable regulatory agency requirements.

Appendix C.2
CARB, SCAQMD, and STAC Certifications

State of California

Air Resources Board

Approved Independent Contractor

Montrose Air Quality Services, LLC

This is to certify that the company listed above has been approved by the California Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, through June 30, 2020, for those test methods listed below:

CARB Source Test Methods:

1, 2, 3, 4, 5, 6, 8, 17, 20

100 (CO, CO_2, NOx, O_2, SO_2, THC)

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

Montrose Air Quality Services, LLC

This is to certify that the company listed above has been approved by the California Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, through June 30, 2020, for those test methods listed below:

U.S. EPA Source Test Methods 201A, 202 and 205
Visible Emissions Evaluation

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

September 6, 2019

Mr. John Peterson
Montrose Air Quality Services, LLC
1631 E. Saint Andrew Place
Santa Ana, CA 92705

Subject: LAP Approval Notice
Reference # 96LA1220

Dear Mr. Peterson:

We have reviewed your renewal letter under the South Coast Air Quality Management District's Laboratory Approval Program (LAP). We are pleased to inform you that your firm is approved for the period beginning September 30, 2019, and ending September 30, 2020 for the following methods, subject to the requirements in the LAP Conditions For Approval Agreement and conditions listed in the attachment to this letter:

Methods 1-4	Methods 5.1, 5.2, 5.3, 6.1
Methods 10.1 and 100.1	Methods 25.1 and 25.3 (Sampling)
USEPA CTM-030 and ASTM D6522-00	Rule 1121/ 1146.2 Protocol

Rule 1420/1420.1/1420.2 – (Lead) Source and Ambient Sampling

Your LAP approval to perform nitrogen oxide emissions compliance testing for Rule 1121/ 1146.2 Protocols includes satellite facilities located at:

McKenna Boiler 1510 North Spring Street Los Angeles, CA 90012	Noritz America Corp. 11160 Grace Avenue Fountain Valley, CA 92708	Ajax Boiler, Inc. 2701 S. Harbor Blvd. Santa Ana, CA 92704

Laundry Building of VA Greater Los Angeles Healthcare System
508 Constitution Avenue
Los Angeles, CA 90049

Thank you for participating in the LAP. Your cooperation helps us to achieve the goal of the LAP: to maintain high standards of quality in the sampling and analysis of source emissions. You may direct any questions or information to LAP Coordinator, Glenn Kasai. He may be reached by telephone at (909) 396-2271, or via e-mail at gkasai@aqmd.gov.

Sincerely,

D. Sarkar

Dipankar Sarkar
Program Supervisor
Source Test Engineering

DS:GK/gk
Attachment

190906 LapRenewalRev.doc

Cleaning the air that we breathe...

MONTROSE AIR QUALITY SERVICES

STAC STACK TESTING ACCREDITATION COUNCIL

A2LA American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

MONTROSE AIR QUALITY SERVICES

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 11th day of February 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3925.01
Valid to February 28, 2022

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

Appendix C.3
Individual QI Certifications

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVE A. WONDERLY

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS

ISSUED THIS 29TH DAY OF NOVEMBER 2018 AND EFFECTIVE UNTIL NOVEMBER 28TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Tina Sanderson, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2009-298

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVE A. WONDERLY

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GASEOUS POLLUTANTS SOURCE SAMPLING METHODS

ISSUED THIS 29TH DAY OF NOVEMBER 2018 AND EFFECTIVE UNTIL NOVEMBER 28TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakainis, QSTI/QSTO Review Board

Tina Sanderson, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2009-298

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVE A. WONDERLY

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 28TH DAY OF SEPTEMBER 2018 AND EFFECTIVE UNTIL SEPTEMBER 27TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Tina Sanderson, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2009-298

APPENDIX D
TEST PLAN

TEST PLAN FOR
2020 EMISSIONS PERFORMANCE TESTING AT THE DESERT VIEW POWER PLANT

Prepared For:

Desert View Power
62-300 Gene Welmas Dr.
Mecca, California 92254-0758

For Submittal To:

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, California 91765-4178

Prepared By:

Montrose Air Quality Services, LLC
1631 E. St. Andrew PL.
Santa Ana, California 92705
(714) 279-6777

Dave Wonderly

Production Date: **January 13, 2020**
Document Number: **W002AS-678786-PP-86**

CONFIDENTIALITY STATEMENT

Except as otherwise required by law or regulation, this information contained in this communication is intended exclusively for the individual or entity to which it is addressed. This communication may contain information that is proprietary, privileged or confidential or otherwise legally exempt from disclosure. If you are not the named addressee, you are not authorized to read, print, retain, copy, or disseminate this message or any part of it.

REVIEW AND CERTIFICATION

I certify that, to the best of my knowledge, the information contained in this document is complete and accurate and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: _____ Date: 1/15/2020

Name: Dave Wonderly Title: Client Project Manager

I have reviewed, technically and editorially, details and other appropriate written materials contained herein. I hereby certify that to the best of my knowledge the presented material is authentic and accurate and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: _____ Date: 1/15/2020

Name: Matt McCune Title: Regional Vice President

TABLE OF CONTENTS

SECTION **PAGE**

1.0 INTRODUCTION 5
2.0 UNIT DESCRIPTION 6
2.1 SAMPLE LOCATIONS 7
2.2 UNIT OPERATION 7
3.0 TEST PROCEDURES 8
3.1 CONTINUOUS GASEOUS MEASUREMENTS 9
3.2 PARTICULATE MEASUREMENTS 10
3.3 SULFUR DIOXIDE 10
3.4 HYDROCARBON 10
3.5 HYDROGEN CHLORIDE MEASUREMENTS 11
3.6 VELOCITY AND MOISTURE 11
3.7 FUEL ANALYSIS 11
3.8 RELATIVE ACCURACY TEST AUDIT 12
3.9 TEST SCHEDULE 13
4.0 REPORTING 14

LIST OF APPENDICES

A QUALITY ASSURANCE AND CERTIFICATIONS 15
B SAMPLE LOCATION VERIFICATION DATA 25
C SITE SAFETY PLAN 94

LIST OF TABLES

TABLE 2-1 CONTINUOUS EMISSION MONITOR SYSTEM 6
TABLE 3-1 PROPOSED TEST MATRIX PER UNIT 8
TABLE 3-2 EPA METHOD 5 ANALYSES 10
TABLE 3-3 TEST SCHEDULE 13
TABLE 4-1 REPORT FORMAT 14

LIST OF FIGURES

FIGURE 2-1 DESERT VIEW POWER SAMPLE LOCATION 7

1.0 INTRODUCTION

Montrose Air Quality Services, LLC (MAQS) has been contracted by Desert View Power to conduct annual emissions compliance testing on two Fluid Bed Boilers, and a relative accuracy test audit (RATA) of the continuous emissions monitoring system (CEMS) at the Desert View Power Plant located in Mecca, California. MAQS will conduct testing to comply with U.S. Environmental Protection Agency Operating Permit NSR 4-4-11;SE 87-01 including amendments through August 14, 2003: 7th Amendment Title V permit to operate CB-OP 99-01 dated 8/1/2000 and 40 CFR 60, Appendix F. This test plan presents the testing procedures, a description of the sample locations and a summary of quality assurance procedures.

David Wonderly will coordinate the testing for MAQS and can be reached at (714) 279-6777. The on-site test team will consist of a Project Manager whose responsibilities include interfacing with facility personnel, operating the mobile emission measurement laboratory, and performing data entry as well as Technician(s) responsible for all stack responsibilities. A Qualified Individual, as defined in ASTM D7036-04, will be on-site for all methods performed.

Emissions tests will be performed on each Biomass fired boiler as specified in the permit for:

- Particulate
- NO_x, CO and SO_2
- Hydrocarbons
- Hydrogen Chloride (HCl)
- Method 19 F-Factor Using ASTM D6323 and ASTM E711 for Fuel BTU/lb
- Volumetric Flow Rate
- Oxygen and Carbon Dioxide concentration
- Flue gas moisture content

A relative accuracy test audit will be performed to satisfy the requirements of 40 CFR 60, Appendix F, as part of the quarterly CEMS testing. The Continuous Emissions Monitoring System (CEMS) Relative Accuracy Test Audit includes NO_x, CO and SO_2.

2.0 UNIT DESCRIPTION

The Desert View Power Plant consists of two 297 MMBtu/hour, circulating bed, biomass-fired boilers, and combined unit are designed to produce 47 MW of net electrical output. Each unit is equipped with the following pollution control systems:

- An ammonia injection system for control of NO_x emissions;
- Cyclonic mixing of injected ammonia with flue gas to provide for a minimum amount of ammonia slip (emission);
- A limestone injection system to limit emissions of SO_2;
- A hydrated lime injection system to limit emissions of HCL;
- A reverse air baghouse to restrict opacity and emissions of sulfates and particulate to very low levels.

The plant CEM system for each unit includes measurements of NO_x, CO, O_2, O_2 wet, SO_2, CO_2, flow and opacity. It is an extractive system with a heated line extending from the probe to the CEM unit. Table 2-1 presents the current CEMS configuration.

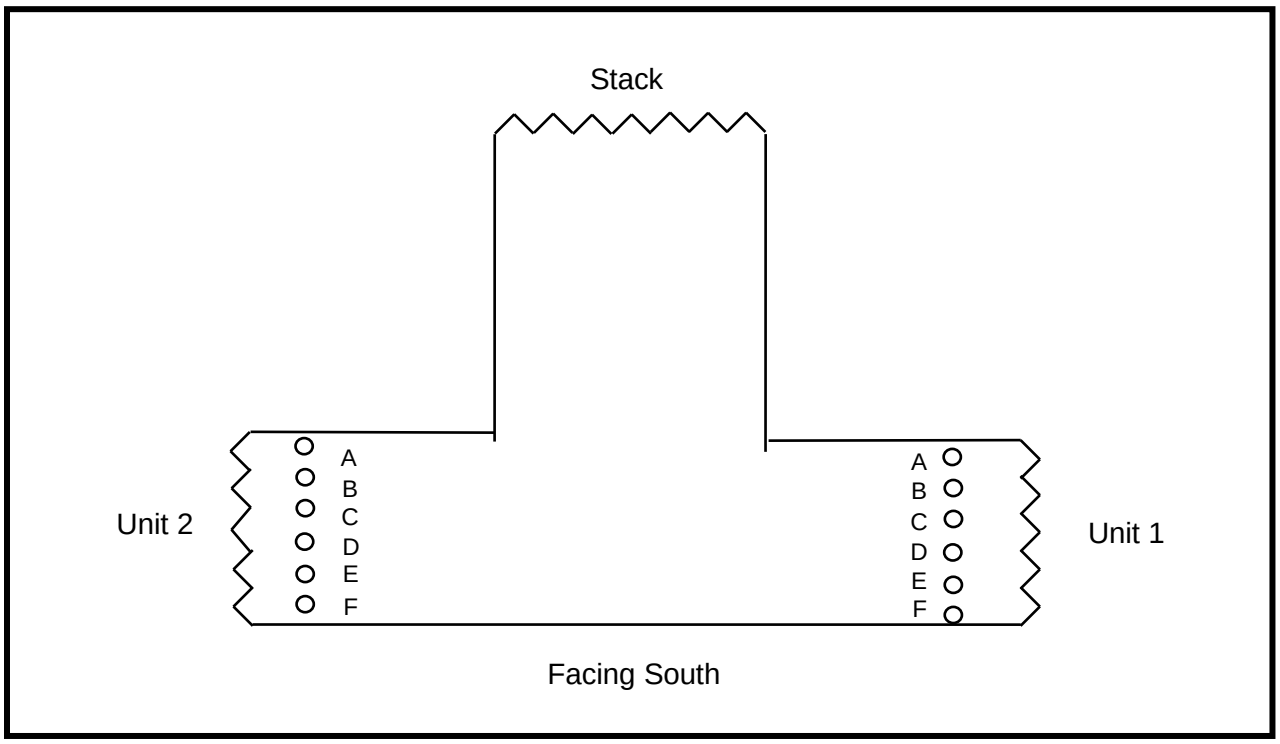
TABLE 2-1
CONTINUOUS EMISSION MONITOR SYSTEM
DESERT VIEW POWER PLANT

Species	Manufacturer	Model	Range
NO_x	CAI	ZRE-5 Multi Component Analyzer	100 and 500 ppm
CO	CAI	ZRE-5 Multi Component Analyzer	100 and 500 ppm
O_2 Dry	CAI	ZRE-5 Multi Component Analyzer	25%
SO_2	CAI	ZRE-5 Multi Component Analyzer	50 and 500 ppm
CO_2	CAI	ZRE-5 Multi Component Analyzer	20%
O_2 Wet	AMETEK	Thermox 2000	25%
Flow	Diet Greg Standard	--	Msdcfh
Opacity	Monitor Labs	Lighthawk 560	100%

2.1 SAMPLE LOCATIONS

Samples will be collected from the transition ducts to the stack. Carnot Technical Services, Inc. conducted three dimensional flow testing and stratification testing on the transition exhaust ducts on each unit. This testing was conducted in accordance to SCAQMD chapter X section 1 and 13 and will be presented in the report titled "Stack Gas Stratification and Absence of Flow Disturbance Testing at Desert View Power Mecca Project" (R106E622.T) submitted to SCAQMD in October of 1994. The sample locations met all the requirements. Copies of the results from that report can be found in Appendix B .All testing for both Unit 1 and 2 will be done at the sample location presented in Figure 2-1.

FIGURE 2-1
DESERT VIEW POWER SAMPLE LOCATION



2.2 UNIT OPERATION

The tests will be conducted at or near maximum steady state unit load conditions. Limestone injection rate, fuel combustion rate, ammonia injection rate, ash handling operations, excess air level, combustion air distribution, and combustion temperature will all be set to maintain stable unit operation. Pertinent operating conditions will be recorded by Desert View Power personnel during the tests. Full load will be defined as greater than 267 MMBtu/hr of total (biomass and natural gas) heat input to the boiler.

3.0 TEST PROCEDURES

The test procedures to be used are listed in Table 3-1. Part of the gaseous plant emissions performance testing data will be used for CEMS RATA determinations. A minimum of nine reference method tests are required for all gaseous species relative accuracy (RA) determinations.

TABLE 3-1
PROPOSED TEST MATRIX PER UNIT
DESERT VIEW POWER MECCA PROJECT

Parameter	No. of Tests	Measurement Principle	Reference Method	Duration per Test
NO_x	9(1)	Chemiluminescence	EPA 7E	60/30 minutes
CO	9(1)	Non-Dispersive Infrared	EPA 10	60/30 minutes
O_2/CO_2	9(1)	Non-Dispersive Infrared	EPA 3A	60/30 minutes
PM	3	Gravimetric	EPA 5	90 minutes
SO_2	9(1)	Barium Thorin Titration	EPA 6	60/30 minutes
Hydrocarbons	2	GC/FID	SCAQMD 25.3	60 minute composite
HCL	3	Ion Chromatography	EPA 26A	120 minutes, minimum of 2 DSCM of sample volume
Fuel Sampling	Daily		ASTM D6323	Composite hourly samples
Fuel Btu/lb	Daily		ASTM E711	Composite hourly samples
Fuel Moisture	Daily		ASTM D3173	Composite hourly samples
Fuel Chlorine	Daily		ASTM E776	Composite hourly samples
Stack Gas Flow Rate	--	S-Type Pitot Traverse	EPA 2	--
Moisture	--	Condensation/Gravimetric	EPA 4	--

(1) Includes compliance and RATA test runs.

3.1 CONTINUOUS GASEOUS MEASUREMENTS

NO_x, O_2, CO_2 and CO will be measured according to EPA reference methods using MAQS continuous emissions monitoring system (CEM). NO_x, O_2, CO_2 and CO concentrations will be determined using MAQS mobile emission measurement laboratory. The laboratory is housed in an 18 foot trailer outfitted to provide a clean, quiet, environmentally controlled base for the testing operations. The laboratory has lighting, electrical distribution, air conditioning and heating to support the test instruments and provide for optimal test performance.

Concentrations of these gaseous species are measured using an extractive sampling system consisting of a heated stainless steel probe to minimize reactions, a heat traced Teflon sample line connected to a thermo-electrically cooled sample dryer. Following the dryer, the sample is drawn into a Teflon lined pump where it is pressurized and then filtered for delivery to the gas analysis portion of the system. Gaseous samples will be collected at a single point. Three minimum 60-minute compliance tests will be performed.

NO_x concentration is determined using a California Analytical Instruments (CAI) chemiluminescence analyzer (model 600 Series). The analyzer has full scale ranges from 2.5 to 10,000 ppm. The analyzer is equipped with a vitreous carbon NO_2 - NO converter for the determination of total nitrogen oxides without interference from other nitrogen containing compounds.

Oxygen concentration is determined using a AMI electro-chemical cell analyzer (model # 201). The analyzer has three full scale ranges; 0-5%, 10%, and 25%. The cell contains an electrolytic fluid that reacts with oxygen to generate an electrical signal proportional to the concentration.

CO_2 is measured using a non-dispersive infrared analyzer manufactured by CAI (model # 100 Series). The analyzer has full scale ranges of 0-5%, 10%, 20% and 40%.

CO is measured using a non-dispersive infrared/gas filter correlation analyzer manufactured by TECO (model # 48i). The analyzer has user definable full scale ranges from of 0-10 to 0-10,000 ppm.

The analyzers and sampling system are subjected to a variety of calibration and quality assurance procedures including leak checks, linearity and calibration error determinations before sampling, and system bias and drift determinations as part of each test run. Data are corrected for any observed bias or drift in accordance with the reference methods.

3.2 PARTICULATE MEASUREMENTS

EPA method 5 sampling system will be used to measure the particulate emissions from both Desert View Power units. The sampling system consists of a nozzle, glass probe, 250°F heated filter, two impingers containing DI water, a third empty impinger and a fourth impinger containing silica gel.

The analysis for particulate is summarized in Table 3-2. Gravimetric Analysis will be performed on the probe/nozzle wash and filter.

TABLE 3-2
EPA METHOD 5 ANALYSES

Sample Component	Analysis Procedure
Probe and Nozzle (Front 1/2)	Evaporation/gravimetric
Heated Filter (83 mm)	Bake/gravimetric

3.3 SULFUR DIOXIDE

Sulfur dioxide will be measured according to EPA Method 6. The first three runs will be 60 minutes and will be used to demonstrate compliance and as RATA runs. Subsequent RATA runs will consist of 30 minute tests per the Methods. A barium thorin titration of the hydrogen peroxide impinger samples will yield SO_2 concentrations for nine relative accuracy test runs. The sample system will consist of a heated glass probe connected to the impinger train with an un-heated Teflon sample line. All the unheated portion of the sample train will be recovered and analyzed. Prior to the titrimetric analysis, all SO_x samples will pass through an ion exchange resin. This removes interference associated with ammonium (NH_4^+). The Method 6 train will not include the IPA impinger, which is provided in the method as an option. The H_2O_2 will absorb both SO_2 and SO_3 (if any). SO_3 will be counted as SO_2.

3.4 HYDROCARBON

Samples for hydrocarbon analysis will be collected in clean 6-L Summa Canister and mini water impingers and analyzed according to SCAQMD 25.3. The samples will be analyzed by AtmAA Inc. in Calabasas, CA using TCA/FID or other qualified laboratory. Results will be reported as total non-methane hydrocarbons as carbon.

3.5 HYDROGEN CHLORIDE MEASUREMENTS

Triplicate hydrogen chloride (HCl), samples will be collected using EPA Method 26A. Sampling and analysis for HF and Cl2 which is included in EPA Method 26A will not be performed.
The sampling train consists of:

- A glass nozzle and heated glass probe heated to between 248°F and 273°F
- A Teflon Mat or quartz out-of-stack filter in a glass filter holder heated to 248°F ± 25°F
- Two impingers containing 100 ml of 0.1 N H_2SO_4 for collection of HCl
- One empty impinger
- An impinger containing silica gel

Samples are withdrawn isokinetically from the stack. The Teflon Mat or quartz-fiber filter collects particulate matter. The acidic absorbing solution collect gaseous HCl and is analyzed for HCl by ion chromatography.

The samples are recovered in the following sample fractions:

1. Back half of filter holder, H_2SO_4 Impinger Catch – Weighed for moisture content and recovered with DI water into pre-cleaned HDPE bottle.
2. The filter and probe wash will not be recovered for this test program.

Quality assurance samples collected in the field are:

- A field blank
- A reagent blank: 200 ml of 0.1 N H_2SO_4
- A reagent blank: 200 ml of DI water

The samples will be analyzed by ion chromatography by AAC in Ventura or other qualified laboratory.

3.6 VELOCITY AND MOISTURE

Stack gas velocity and moisture content will be determined by EPA Methods 2 and 4 during the particulate test. Velocity traverses will be performed during each set of compliance tests (NO_x, CO, SO_2 and hydrocarbons) and for each RATA run.

3.7 FUEL ANALYSIS

Daily fuel samples will be collected by Desert View Power personnel. Hourly samples will be taken and composited by the lab prior to analysis. Sampling will be consistent with ASTM D6323 sample collection methodology. MAQS will send the samples out to be analyzed for higher heating value for heat rate calculations, for Btu/lb for calculating the HCL emissions in lb/MMBtu using ASTM E711, for moisture content using ASTM D3173 and for chlorine content using ASTM E776. Copies of the analysis will be included with the final report.

3.8 RELATIVE ACCURACY TEST AUDIT

Relative Accuracy tests will be performed for NO_x, SO_2, CO and O_2 on sub systems of each unit's CEMS. Relative accuracy is determined by comparing the CEMS data to the corresponding reference method (RM) data over nine to twelve test runs. Nine 30-minute minimum tests will be performed for the NO_x, SO_2, CO, and O_2 relative accuracy. Relative accuracy is expressed in terms of the absolute value of the mean of the difference between the monitor value and the reference method value. It is reported in terms of a percentage of the mean reference method value. The computational procedure is summarized by the following equations:

$$\overline{RM} = \frac{1}{n}\sum_{i=1}^{n} RM_1$$

$$\overline{d} = \sum_{i=1}^{n} d_i$$

$$S_d = \left[\frac{\sum_{i=1}^{n} d_i^2 - \frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}}{n-1}\right]^{\frac{1}{2}}$$

$$CC = t_{0.975}\frac{S_d}{\sqrt{n}}1$$

$$RA = \frac{|\overline{d}| + |cc|}{\overline{RM}} x100$$

The RA will be determined for the monitoring systems in parts per million dry (ppm) and lb/hr.

3.9 TEST SCHEDULE

The scheduled test dates have been set for March 10 – March 14, 2020 for compliance and RATA testing. A proposed test schedule for on-site testing activities is shown in Table 3-3. This schedule is based on the number of tests and the required sample times.

TABLE 3-3
TEST SCHEDULE

Date	Unit No.	Test No.	Type of Test
3/10/2020	1	--	Set-up
3/11/2020	1	1-3 PM, 1-3 HCL 1-3 Comp RATA testing	Particulate Tests 1-3, HCL Tests 1-3 CEMS RATA and Compliance NO_x, SO_2, CO &VOC Tests 1-3 Fuel Samples
3/12/2020	1	RATA testing Continued	CEMS RATA
3/13/2020	2	1-3 PM, 1-3 HCL 1-3 Comp RATA testing	Particulate Tests 1-3, HCL Tests 1-3 CEMS RATA and Compliance NO_x, SO_2, CO &VOC Tests 1-3 Fuel Samples
3/14/2020	2	RATA testing Continued	CEMS RATA

4.0 REPORTING

MAQS will prepare a comprehensive emissions report that includes all raw data and calculations for the test program. The test format is presented in Table 4-1. The test report will be submitted within 45 days from completion of testing.

TABLE 4-1
REPORT FORMAT

Title page
Report Title
Prepared For
For Submittal To:
Author and reviewer names
Test Dates and Report Issue Date
Report Number

Review Page
Signatures of person who prepared the report and signature of person who reviewed the report

Table of Contents

Introduction and Summary
Identifies the client, source, reason for the test, test date(s), test personnel, client/source personnel, regulatory observers
Summarizes the results of the test, indicates applicable rules and pass/fail criteria and makes a statement regarding the test results
Outlines the organization of remainder of the report.
Table of analysis results

Unit Description
Describes the process which was tested
Describes any applicable control equipment
Test conditions

Test Description
Test methods, replicates, duration, calculations
Test locations
Test critique

Results
Re-states the results of the test and makes a statement regarding compliance with applicable regulations
Results tables with more detail on individual test runs and supporting data

Appendices
A. Test and Laboratory Data
   1. Test Location
   2. Test Data (by type)
   3. Quality Assurance Data
      a. Certification
      b. Equipment Calibration
      c. Calibration Gas Certificate
      d. Chain of Custody
B. Process Operating Data
C. Measurement Procedures
D. Calculations
E. Instrument Strip Charts

APPENDIX A
QUALITY ASSURANCE AND CERTIFICATIONS

QUALITY ASSURANCE PROGRAM SUMMARY

As part of Montrose Air Quality Services, LLC (MAQS) ASTM D7036-04 certification, MAQS is committed to providing emission related data which is complete, precise, accurate, representative, and comparable. MAQS quality assurance program and procedures are designed to ensure that the data meet or exceed the requirements of each test method for each of these items. The quality assurance program consists of the following items:

- Assignment of an Internal QA Officer
- Development and use of an internal QA Manual
- Personnel training
- Equipment maintenance and calibration
- Knowledge of current test methods
- Chain-of-custody
- QA reviews of test programs

Assignment of an Internal QA Officer: MAQS has assigned an internal QA Officer who is responsible for administering all aspects of the QA program.

Internal Quality Assurance Manual: MAQS has prepared a QA Manual according to the requirements of ASTM D7036-04 and guidelines issued by EPA. The manual documents and formalizes all of MAQS QA efforts. The manual is revised upon periodic review and as MAQS adds capabilities. The QA manual provides details on the items provided in this summary.

Personnel Testing and Training: Personnel testing and training is essential to the production of high quality test results. MAQS training programs include:

- A requirement for all technical personnel to read and understand the test methods performed
- A requirement for all technical personnel to read and understand the MAQS QA manual
- In-house testing and training
- Quality Assurance meetings
- Third party testing where available
- Maintenance of training records.

Equipment Maintenance and Calibration: All laboratory and field equipment used as a part of MAQS emission measurement programs is maintained according to manufacturer's recommendations. A summary of the major equipment maintenance schedules is summarized in Table 1. In addition to routine maintenance, calibrations are performed on all sampling equipment according to the procedures outlined in the applicable test method. The calibration intervals and techniques for major equipment components is summarized in Table 2. The calibration technique may vary to meet regulatory agency requirements.

Knowledge of Current Test Methods: MAQS maintains current copies of EPA, ARB, and SCAQMD Source Test Manuals and Rules and Regulations.

Chain-of-Custody: MAQS maintains chain-of-custody documentation on all data sheets and samples. Samples are stored in a locked area accessible only to MAQS source test personnel. Data sheets are kept in the custody of the originator, program manager, or in locked storage until return to MAQS office. Electronic field data is duplicated for backup on secure storage media. The original data sheets are used for report preparation and any additions are initialed and dated.

QA Reviews: Periodic field, laboratory, and report reviews are performed by the in-house QA coordinator. Periodically, test plans are reviewed to ensure proper test methods are selected and reports are reviewed to ensure that the methods were followed and any deviations from the methods are justified and documented.

ASTM D7036-04 Required Information

Uncertainty Statement

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is presented in Section 4.0.

Performance Data

Performance data are available for review.

Qualified Personnel

A qualified individual (QI), defined by performance on a third party or internal test on the test methods, will be present on each test event.

Plant Entry and Safety Requirements

Plant Entry

All test personnel are required to check in with the guard at the entrance gate or other designated area. Specific details are provided by the facility and project manager.

Safety Requirements

All personnel shall have the following personal protective equipment (PPE) and wear them where designated:

- Hard Hat
- Safety Glasses
- Steel Toe Boots
- Hearing Protection
- Gloves
- High Temperature Gloves (if required)

The following safety measures will be followed:

- Good housekeeping
- SDS for all on-site hazardous materials
- Confine selves to necessary areas (stack platform, mobile laboratory, CEMS data acquisition system, control room, administrative areas)
- Knowledge of evacuation procedures

Each facility will provide plant specific safety training.

TABLE 1
EQUIPMENT MAINTENANCE SCHEDULE

Equipment	Acceptance Limits	Frequency of Service	Methods of Service
Pumps	1. Absence of leaks 2. Ability to draw manufacturers required vacuum and flow	As recommended by manufacturer	1. Visual inspection 2. Clean 3. Replace parts 4. Leak check
Flow Meters	1. Free mechanical movement	As recommended by manufacturer	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero span gas	As recommended by manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	1. Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobil Van Sampling System	1. Absence of leaks	Depends on nature of use	1. Chang filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling lines	1. Sample degradation less than 2%	After each test series	1. Blow dry, inert gas through line until dry

TABLE 2
MAJOR SAMPLING EQUIPMENT CALIBRATION REQUIREMENTS

Sampling Equipment	Calibration Frequency	Calibration Procedure	Acceptable Calibration Criteria
Continuous Analyzers	Before and After Each Test Day	3-point calibration error test	< 2% of analyzer range
Continuous Analyzers	Before and After Each Test Run	2-point sample system bias check	< 5% of analyzer range
Continuous Analyzers	After Each Test Run	2-point analyzer drift determination	< 3% of analyzer range
CEMS System	Beginning of Each Day	leak check	< 1 in. Hg decrease in 5 min. at > 20 in. Hg
Continuous Analyzers	Semi-Annually	3-point linearity	< 1% of analyzer range
NO_x Analyzer	Daily	NO_2 -> NO converter efficiency	> 90%
Differential Pressure Gauges (except for manometers)	Semi-Annually	Correction factor based on 5-point comparison to standard	+/- 5%
Differential Pressure Gauges (except for manometers)	Bi-Monthly	3-point comparison to standard, no correction factor	+/- 5%
Barometer	Semi-Annually	Adjusted to mercury-in-glass or National Weather Service Station	+/- 0.1 inches Hg
Dry Gas Meter	Semi-Annually	Calibration check at 4 flow rates using a NIST traceable standard	+/- 2%
Dry Gas Meter	Bi-Monthly	Calibration check at 2 flow rates using a NIST traceable standard	+/- 2% of semi-annual factor
Dry Gas Meter Orifice	Annually	4-point calibration for ΔH@	--
Temperature Sensors	Semi-Annually	3-point calibration vs. NIST traceable standard	+/- 1.5%

Note: Calibration requirements will be used that meet applicable regulatory agency requirements.

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

September 6, 2019

Mr. John Peterson
Montrose Air Quality Services, LLC
1631 E. Saint Andrew Place
Santa Ana, CA 92705

Subject: LAP Approval Notice
Reference # 96LA1220

Dear Mr. Peterson:

We have reviewed your renewal letter under the South Coast Air Quality Management District's Laboratory Approval Program (LAP). We are pleased to inform you that your firm is approved for the period beginning September 30, 2019, and ending September 30, 2020 for the following methods, subject to the requirements in the LAP Conditions For Approval Agreement and conditions listed in the attachment to this letter:

Methods 1-4	Methods 5.1, 5.2, 5.3, 6.1
Methods 10.1 and 100.1	Methods 25.1 and 25.3 (Sampling)
USEPA CTM-030 and ASTM D6522-00	Rule 1121/ 1146.2 Protocol

Rule 1420/1420.1/1420.2 – (Lead) Source and Ambient Sampling

Your LAP approval to perform nitrogen oxide emissions compliance testing for Rule 1121/ 1146.2 Protocols includes satellite facilities located at:

McKenna Boiler 1510 North Spring Street Los Angeles, CA 90012	Noritz America Corp. 11160 Grace Avenue Fountain Valley, CA 92708	Ajax Boiler, Inc. 2701 S. Harbor Blvd. Santa Ana, CA 92704

Laundry Building of VA Greater Los Angeles Healthcare System
508 Constitution Avenue
Los Angeles, CA 90049

Thank you for participating in the LAP. Your cooperation helps us to achieve the goal of the LAP: to maintain high standards of quality in the sampling and analysis of source emissions. You may direct any questions or information to LAP Coordinator, Glenn Kasai. He may be reached by telephone at (909) 396-2271, or via e-mail at gkasai@aqmd.gov.

Sincerely,

D. Sarkar

Dipankar Sarkar
Program Supervisor
Source Test Engineering

DS:GK/gk
Attachment

190906 LapRenewalRev.doc

Cleaning the air that we breathe...

MONTROSE AIR QUALITY SERVICES

State of California
Air Resources Board
Approved Independent Contractor

Montrose Air Quality Services, LLC

This is to certify that the company listed above has been approved by the California Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, through June 30, 2020, for those test methods listed below:

CARB Source Test Methods:

1, 2, 3, 4, 5, 6, 8, 17, 20

100 (CO, CO_2, NOx, O_2, SO_2, THC)

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California
Air Resources Board
Approved Independent Contractor
Montrose Air Quality Services, LLC

This is to certify that the company listed above has been approved by the California Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, through June 30, 2020, for those test methods listed below:

U.S. EPA Source Test Methods 201A, 202 and 205
Visible Emissions Evaluation

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

STAC STACK TESTING ACCREDITATION COUNCIL

A2LA American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

MONTROSE AIR QUALITY SERVICES

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 5th day of March 2018.

President and CEO
For the Accreditation Council
Certificate Number 3925.01
Valid to February 29, 2020

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

MONTROSE AIR QUALITY SERVICES

APPENDIX B
SAMPLE LOCATION VERIFICATION DATA

STACK GAS STRATIFICATION AND ABSENCE OF FLOW DISTURBANCE TESTING AT COLMAC MECCA PROJECT

Prepared For:

UC Operating Service
Mecca, California

For Submittal To:

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Diamond Bar, California

Prepared By:

Edward J. Filadelfia

CARNOT
Tustin, California

JULY 1994

REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and documented in this report were carried out under my direction and supervision.

Date 10/14/94

Edward J. Filadelfia
Senior Engineer

I have reviewed, technically and editorially, details, calculations, results, conclusions and other appropriate written material contained herein, and hereby certify that the presented material is authentic and accurate.

Date 10/14/94

Edward J. Filadelfia
Senior Engineer

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION	1
2.0	UNIT DESCRIPTION	3
3.0	TEST DESCRIPTION	4
3.1	TEST CONDITIONS	4
3.2	SAMPLE LOCATION	4
3.3	TEST PROCEDURES	4
3.3.1	Gaseous Stratification	4
4.0	RESULTS	7
4.1	GASEOUS STRATIFICATION	7
4.2	FLOW DISTURBANCE	7
APPENDICES		
A	MEASUREMENT PROCEDURES	A-1
B	QUALITY ASSURANCE	B-1
B.1	Quality Assurance Program Summary	B-2
B.2	ARB Certification/SCAQMD Letter	B-7
B.3	Calibration Data	B-8
C	DATA SHEETS	C-1
C.1	Sample Locations	C-2
C.2	CEM Data	C-3
C.3	3D Flow Data	C-4
D	CALCULATIONS	D-1
E	STRIP CHARTS	E-1

SECTION 1.0

INTRODUCTION

Carnot was contracted by UC Operating Service (UCOS) to determine the suitability of the alternate sample location accessible from the stack inlet duct. Tests were conducted to determine the level of stack gas stratification and flow disturbance. The tests were performed at this location to satisfy the requirements of alternate sample location CFR 40 Appendix A Method 1. The tests were performed using the standard methods in Chapter X of the SCAQMD's Source Test Manual.

The flow disturbance and gaseous stratification tests were performed on June 27-28, 1994. The test program was coordinated by Greg Deedon of UCOS and Edward Filadelfia of Carnot. The Carnot test team consisted of Edward Filadelfia, Dave Wonderly, and Chris Hone. Unit operation was established and maintained by UCOS personnel.

The results of the tests are summarized in Tables 1-1 and 1-2. These results show that the sample location meets the requirements of the SCAQMD and EPA by demonstrating that the stack gas stratification is less than 10% and the average resultant flow angle is less than 20 degrees with a standard deviation of less than 10 degrees.

A description of the unit is presented in Section 2.0. Test procedures and locations are presented in Section 3.0. Test results are presented in Section 4.0. Tests procedure descriptions, field data sheets, calculations, and control room data are included in the Appendices.

TABLE 1-1
SUMMARY OF GASEOUS STRATIFICATION
COLMAC ENERGY PROJECT
JULY 1994

Parameter	Unit 1 % Stratification	Unit 2 % Stratification	SCAQMD Limit, %
O_2, %	0.4%	1.0%	≤10

TABLE 1-2
SUMMARY OF FLOW DISTURBANCE MEASUREMENTS
COLMAC ENERGY PROJECT
JULY 1994

Parameter	Unit 1 Measured	Unit 2 Measured	SCAQMD Limit, %	EPA Limit, %
Average Resultant Angle, Degrees	5.6°	5.9°	≤20	≤20
Standard Deviation, Degrees	3.3°	4.0°	≤10	N/A

SECTION 2.0

UNIT DESCRIPTION

The Colmac Energy Plant consists of two 297 MMBtu/hour, circulating bed boilers, the combined units are designed to produce 47 MW of net electrical output. Each unit is equipped with the following pollution control systems:

1. An ammonia injection system for control of NO_x emissions.

2. Cyclonic mixing of injected ammonia with flue gas to provide for a minimum amount of ammonia slip (emission).

3. A limestone injection system to limit emissions of SO_2.

4. A reverse air baghouse to restrict opacity and emissions of sulfates and particulate to very low levels.

SECTION 3.0

TEST DESCRIPTION

3.1 TEST CONDITIONS

All tests were performed with the unit operating at full load. Tests were conducted while the unit was firing bio mass and operating under normal conditions. Unit operations were established by UCOS operators.

3.2 SAMPLE LOCATION

Measurements were made from Units 1 and 2 inlet ducts to the stack. A schematic of the Sample location is shown in Figure 3-1. Chapter X sampling consisted of 40 point traverse for stratification, and a 42 point traverse for flow disturbances.

3.3 TEST PROCEDURES

Tests were performed using methods from the SCAQMD's Source Test Manual. These methods are contained in Chapter X - Section 1 for disturbed flow and Section 13 for gaseous stratification. Table 3-1 presents the test methods used in this program. O_2 concentrations were measured using Carnot's mobile emission monitoring system. Flow angles were measured using a United Sensor 3D probe. A description of the Carnot's Continuous Emissions Monitoring System and the standard measurement procedures are presented in Appendix A. A summary of the procedures used for gaseous stratification and disturbed flow are presented below.

3.3.1 Gaseous Stratification

Chapter X (Non-Standard Methods and Techniques), Chapter 13 of the SCAQMD Source Test Manual defines gaseous stratification as the presence of a difference, in excess of 10 percent, between any two points in the same cross sectional plane. Stratification can be determined for either pollutant gases (e.g., NO_x) or diluent gases (e.g., O_2, CO_2) in units of concentration. For this test program, the O_2 concentration was used to measure the level of stack gas stratification.

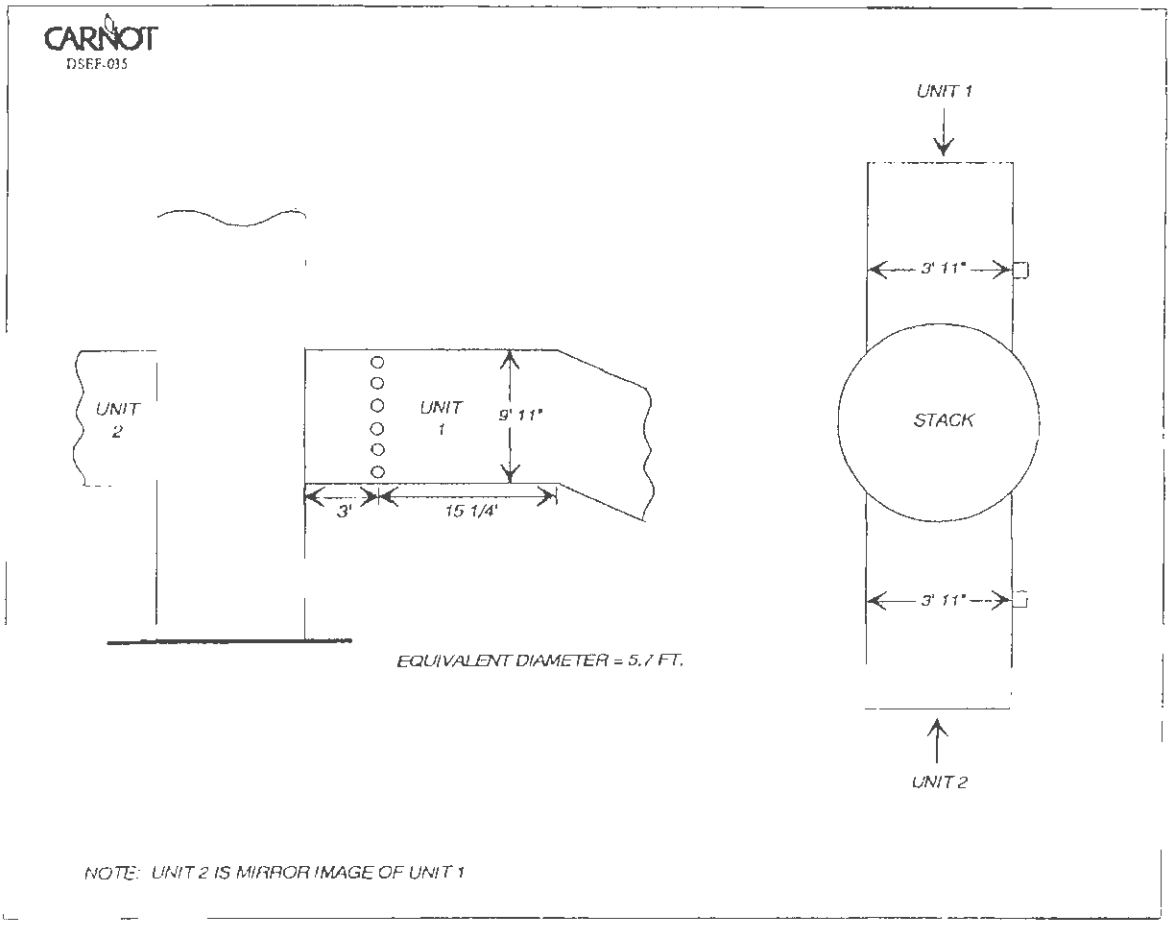


Figure 3-1. UCOS - Duct Sample Locations

Due to variations in process O_2 concentrations, two O_2 analyzers were used. The first O_2 analyzer was used as a reference point and located at the center of the duct. The second was located at 40 traverse points during the test. Gases were monitored for three minutes at each traverse point.

TABLE 3-1
TEST PROCEDURES
COLMAC ENERGY PROJECT
JULY 1994

Parameter	Units	Measurement Principle	Reference Method	Comments
O_2	%	Electrochemical Call	EPA 3A	40 point traverse for gaseous stratification according to Chapter X, Section 13
Flow Angle	Degrees	3D probe for pitch and yaw	1.1	42 point traverse for disturbed flow according to Chapter X, Section 1

SECTION 4.0

RESULTS

4.1 GASEOUS STRATIFICATION

The results of the gaseous stratification tests are summarized in Table 4-1. The results show that the O_2 concentration stratification levels for both sample locations were below the limit of 10%.

TABLE 4-1
GASEOUS STRATIFICATION
COLMAC ENERGY PROJECT
JULY 1994

Parameter	Percent Stratification
Unit 1 O_2, %	0.4%
Unit 2 O_2, %	1.0%

4.2 FLOW DISTURBANCE

The results of the flow disturbance measurements made with the 3-dimensional velocity probe are presented in Table 4-2. The results of these tests show that the average resultant flow angle was below the limit of 20 degrees with a standard deviation of less than 10 degrees for both sample locations.

TABLE 4-2
FLOW DISTURBANCE RESULTS
COLMAC ENERGY PROJECT
JULY 1994

Parameter	Unit 1 3D Probe	Unit 2 3D Probe
Avg. Yaw Angle, degrees	2.0	4.4
Avg. Pitch Angle, degrees	-0.4	-1.0
Avg. Resultant Angle, degrees	5.6	5.9
Standard Deviation, degrees	3.3	4.0

APPENDIX A

MEASUREMENT PROCEDURES

Continuous Emissions Monitoring System

Oxygen (O_2) by Continuous Analyzer

Three-Dimensional Velocity Testing

Continuous Emissions Monitoring System

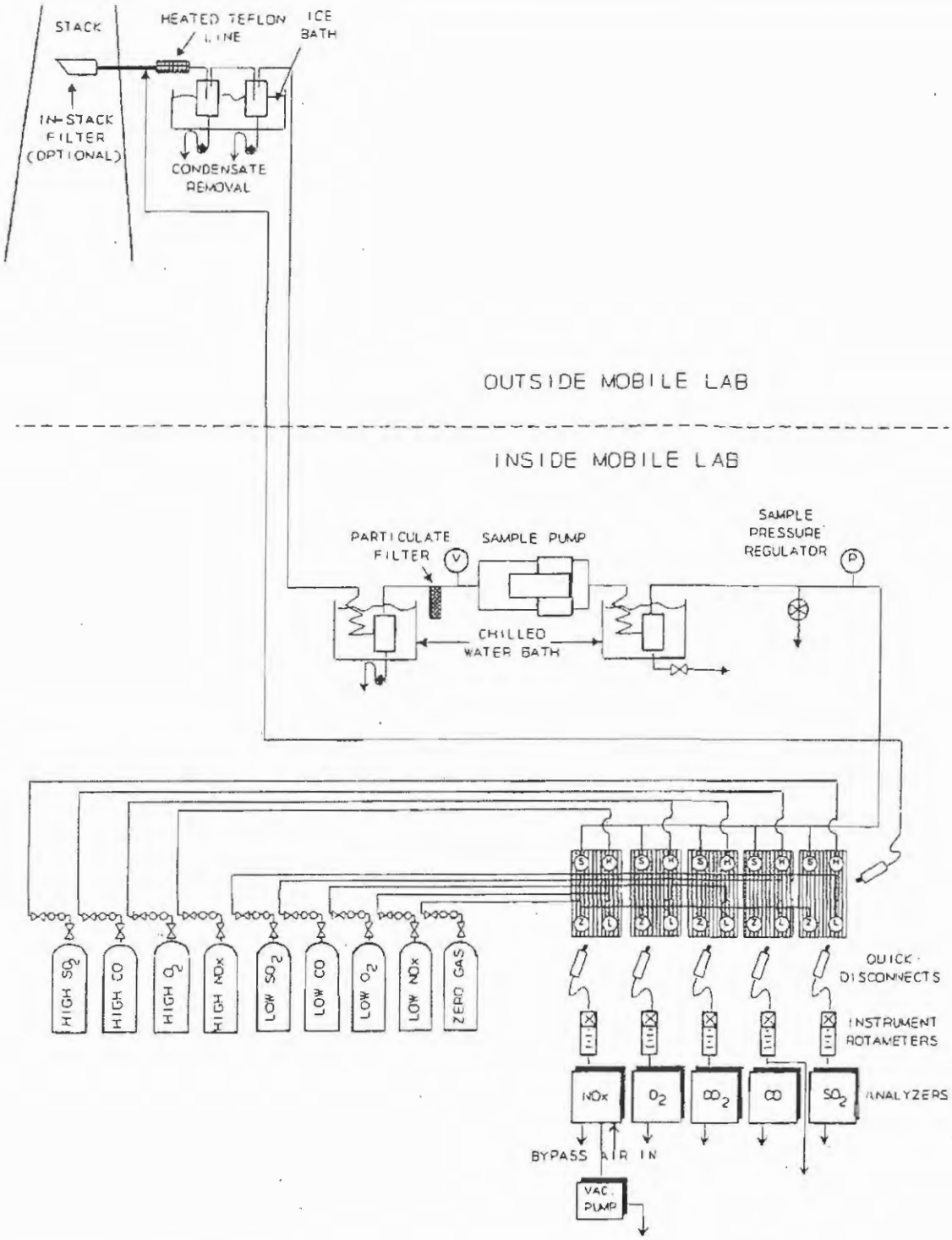
O_2, CO, CO_2, NO, NO_x and SO_2 are measured using an extractive continuous emissions monitoring (CEM) package, shown in the following figure. This package is comprised of three basic subsystems. They are: (1) the sample acquisition and conditioning system, (2) the calibration gas system, and (3) the analyzers themselves. This section presents a description of the sampling and calibration systems. Descriptions of the analyzers used in this program and the corresponding reference test methods follow. Information regarding quality assurance information on the system, including calibration routines and system performance data follows.

The sample acquisition and conditioning system contains components to extract a representative sample from the stack or flue, transport the sample to the analyzers, and remove moisture and particulate material from the sample. In addition to performing the tasks above, the system must preserve the measured species and deliver the sample for analysis intact. The sample acquisition system extracts the sample through a stainless steel probe. The probe is insulated or heated as necessary to avoid condensation. If the particulate loading in the stack is high, a sintered stainless steel filter is used on the end of the probe.

Where water soluble NO_2 and/or SO_2 are to be measured, the sample is drawn from the probe through a heated teflon sample line into an on-stack cooled (approximately 35-40°F) water removal trap. The trap consists of stainless steel flasks in a bath of ice and water. This design removes the water vapor by condensation. The contact between the sample and liquid water is minimized and the soluble NO_2 and SO_2 are conserved. This system meets the requirements of EPA Method 20. The sample is then drawn through a teflon transport line, particulate filter, secondary water removal and into the sample pump. The pump is a dual head, diaphragm pump. All sample-wetted components of the pump are stainless steel or teflon. The pressurized sample leaving the pump flows through a third condensate trap in a refrigerated water bath (≈38°F) for final moisture removal. A drain line and valve are provided to constantly expel any condensed moisture from the dryer at this point. After the dryer, the sample is directed into a distribution manifold. Excess sample is vented through a back-pressure regulator, maintaining a constant pressure of 5-6 psig to the analyzer rotameters.

The calibration system is comprised of two parts: the analyzer calibration, and the system bias check (dynamic calibration). The analyzer calibration equipment includes pressurized cylinders of certified span gas. The gases used are, as a minimum, certified to 1% by the manufacturer. Where necessary to comply with reference method requirements EPA Protocol 1 gases are used. The cylinders are equipped with pressure regulators which supply the calibration gas to the analyzers at the same pressure and flow rate as the sample. The selection of zero, span, or sample gas directed to each analyzer is accomplished by operation of the sample/calibration selector fittings.

The system bias check is accomplished by transporting the same gases used to zero and span the analyzers to the sample system as close as practical to the probe inlet. This is done either by attaching the calibration gas supply line to the probe top with flexible tubing or by actuation of a solenoid valve located at the sample conditioner inlet (probe exit). The span gas is exposed to the same elements as the sample and the system response is documented. The analyzer indications for the system calibration check must agree within 5% of the analyzer calibration. Values are adjusted and changes/repairs are made to the system to compensate for any difference in analyzer readings. Specific information on the analytical equipment and test methods used is provided in the following pages.



Schematic of CEM System

Method:	Oxygen (O_2) by Continuous Analyzer
Applicable Reference Methods:	EPA 3A, EPA 20, ARB 100, BA ST-14, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of O_2 concentration.
Analyzer:	Teledyne Model 326A
Measurement Principle:	Electrochemical cell
Ranges:	0-5, 0-10, 0-25 % O_2
Accuracy:	1 % of full scale
Output:	0-100 mV, linear
Interferences:	Halogens and halogenated compounds will cause a positive interference. Acid gases will consume the fuel cell and cause a slow calibration drift.
Response Time:	90% <7 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. If Method 20 is used, that method's specific procedures for selecting sample points are used. Otherwise, stratification checks are performed at the start of a test program to select single or multiple-point sample locations.
Analytical Procedure:	An electrochemical cell is used to measure O_2 concentration. Oxygen in the flue gas diffuses through a Teflon membrane and is reduced on the surface of the cathode. A corresponding oxidation occurs at the anode internally, and an electric current is produced that is proportional to the concentration of oxygen. This current is measured and conditioned by the instrument's electronic circuitry to give an output in percent O_2 by volume.
Special Calibration Procedure:	The measurement cells used with the O_2 instrument have to be replaced on a regular basis. After extended use, the cell tend to produce a nonlinear response. Therefore, a three-point calibration is performed at the start of each test day to check for linearity. If the response is not linear ($\pm$ 2% of scale), the cell is replaced.

Method:	Three-Dimensional Velocity Testing
Applicable Ref. Method:	EPA Method 1, ANSI ASME PTC 11 - 1984
Applicability of Method:	When a sample location to be used for velocity or particulate tests does not meet the traditional Method 1 criteria of being at least two duct diameters downstream and one-half diameter upstream of any flow disturbance, this alternate method is used to evaluate the suitability of the location. A three-dimensional velocity probe is used to measure pitch and yaw angle at a minimum of 40 traverse points for round ducts and 42 points for rectangular ducts. If the average resultant angle is less than 20° and the standard deviation is less than 10°, the sample location is deemed acceptable. Velocity and particulate traverses are then performed at the same traverse points using standard Method 2 and 5 equipment and procedures.
Principle:	The instrument measures yaw and pitch angles of fluid flow, as well as total and static pressures.
Analyzer:	United Sensor Three-Dimensional Directional Probe
Sampling Procedure:	Each probe has five measuring holes in its tip. A centrally located pressure hole measures pressure P1, while two lateral pressure holes measure pressures P2 and P3. If the probe is rotated manually until P2 and P3 are identical as a readout on the manometer, the yaw angle of flow is then indicated by the number of degrees rotated. When the yaw angle has been determined, an additional differential pressure P4 - P5 is measured by pressure holes located above and below the total pressure (P1) hole. Pitch angle is determined by calculating (P4 - P5)/(P1 - P2) and using the calibration data for the individual probe and interpolating between the bracketing data. At any particular pitch angle, the velocity pressure coefficient (Pt - Ps)/(P1 -P2) can also be interpolated from the calibration data and Pt - Ps and Ps calculated. Note that this probe also allows for very accurate gas flow measurements, in addition to the EPA Method 1 procedures that allow it to be used for determination of flow angle.

Definitions:

P_1 = Total Pressure
P_2 = Static Pressure
P_3 = Static Pressure
P_4 = Pitch Pressure
P_5 = Pitch Pressure

$P_1 - P_2$ = Velocity Head Pressure

$\frac{P_4 - P_5}{P_1 - P_2}$ = Pitch angle calculated on calibration curve

Calculations:

Velocity (fps) in direction of flow

$$V_s = 2.90\ C_P\sqrt{\Delta P\ T_s}\ \sqrt{\left(\frac{29.92}{P_S}\right)\left(\frac{28.95}{MW_{wet}}\right)}$$

where:
C_P = Pitot Calibration factor
ΔP = Average velocity, head, iwg $(\overline{\sqrt{\Delta P}})^2$
T_S = Stack Temperature, °R
P_S = Stack Pressure (iwg)
MW_{wet} = Molecular weight, wet

Resultant angle:

$$R = \left| \frac{\cos^{-1}(\cos\phi_{Y,R}\ \cos\phi_{P,R})}{0.0175} \right|$$

where:
$\phi_{Y,R}$ = Yaw Angle in Radians
$\phi_{P,R}$ = Pitch Angle in Radians
R = Resultant Angle in Degrees

Pitch Angle Curve Fit Equation (Degrees)

$$\phi_P = A_1\left(\frac{P_4-P_5}{P_1-P_2}\right) + A_2\left(\frac{P_4-P_5}{P_1-P_2}\right)^2 - A_3\left(\frac{P_4-P_5}{P_1-P_2}\right)^3 - A_4\left(\frac{P_4-P_5}{P_1-P_2}\right)^4 + A_5\left(\frac{P_4-P_3}{P_1-P_2}\right)^5 + A_6\left(\frac{P_4-P_5}{P_1-P_2}\right)^6$$

Pitot coefficient curve fit equation (used to calculate corrected axial velocities)

$$\frac{P_t-P_s}{P_1-P_2} = B_1 + B_2\ \phi_P + B_3 + \phi_P + B_4\ \phi_P^3 + B_5\ \phi_P^4 + B_6\ \phi_P^5 + B_7\ \phi_P^6$$

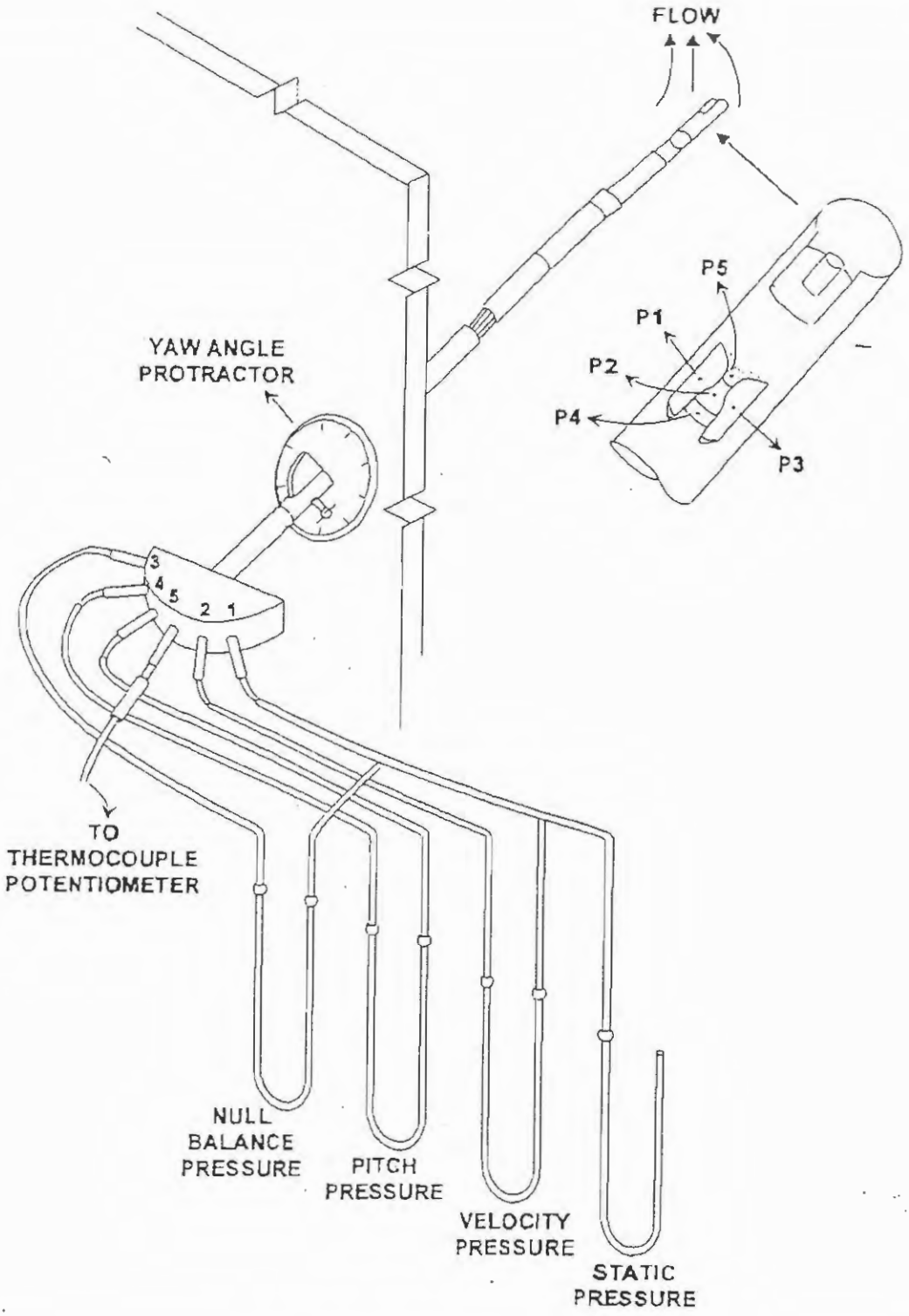


Figure Five Hole Probe

3-DIMENSIONAL VELOCITY PROBE CALIBRATION FACTORS

Probe	B-2455
A_1	63.09
A_2	23.69
A_3	24.505
A_4	33.312
A_5	7.5203
A_6	11.669
B_1	0.997
B_2	7×10^{-3}
B_3	3×10^{-5}
B_4	8×10^{-7}
B_5	1×10^{-9}
B_6	3×10^{-10}
B_7	3×10^{-2}

APPENDIX B
QUALITY ASSURANCE

Appendix B.1

Quality Assurance Program Summary

QUALITY ASSURANCE PROGRAM SUMMARY AND ARB CERTIFICATION

Carnot ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA Officer and encompasses seven major areas:

1. Development and use of an internal QA manual.
2. QA reviews of reports, laboratory work, and field testing.
3. Equipment calibration and maintenance.
4. Chain of custody.
5. Training.
6. Knowledge of current test methods.
7. Agency certification.

Each of these areas is discussed individually below.

Quality Assurance Manual. Carnot has prepared a QA Manual according to EPA guidelines. The manual serves to document and formalize all of Carnot's QA efforts. The manual is constantly updated, and each member of the Source Test Division is required to read and understand its contents. The manual includes details on the other six QA areas discussed below.

QA Reviews. Carnot's review procedure includes review of each source test report by the QA Officer, and spot check reviews of laboratory and field work.

The most important review is the one that takes place before a test program begins. The QA Officer works closely with Source Test Division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emissions measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the California Air Resources Board (CARB). The schedule for maintenance and calibrations are given in Tables B-1 and B-2. Quality control checks are also conducted in the field for each test program. The following is a partial list of checks made as part of each CEM system test series.

- Sample acquisition and conditioning system leak check.
- 2-point analyzer calibrations (all analyzers)
- 3-point analyzer calibrations (analyzers with potential for linearity errors).
- Complete system calibration check ("dynamic calibration" through entire sample system).

- Periodic analyzer calibration checks (once per hour) are conducted at the start and end of each test run. Any change between pre- and post-test readings are recorded.

- All calibrations are conducted using gases certified by the manufacturer to be + 1% of label value (NBS traceable).

Calibration and CEM performance data are fully documented, and are included in each source test report.

Chain of Custody. Carnot maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Carnot documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only Source Test Division personnel have access. Neither other Carnot employees nor cleaning crews have keys to this area.

Data sheets are copied immediately upon return from the field, and this first generation copy is placed in locked storage. Any notes made on original sheets are initialed and dated.

Training. Personnel training is essential to ensure quality testing. Carnot has formal and informal training programs which include:

1. Attendance at EPA-sponsored training courses.
2. Enrollment in EPA correspondence courses.
3. A requirement for all technicians to read and understand Carnot's QA Manual.
4. In-house training and QA meetings on a regular basis.
5. Maintenance of training records.

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. Carnot subscribes to services which provide updates on EPA and CARB reference methods, and on EPA, CARB and SCAQMD rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. Carnot personnel maintain membership in the Air and Waste Management Association, the Source Evaluation Society, and the ASME Environmental Control Division.

AGENCY CERTIFICATION

Carnot is certified by the CARB as an independent source test contractor for gaseous and particulate measurements. Carnot is certified by the SCAQMD as an independent source test contractor for gaseous and particulate measurements using SCAQMD Methods 1, 2, 3, 4, 5, 6, 7 and 100.1. Carnot also participates in EPA QA audit programs for Methods 5, 6 and 7.

TABLE B-1
SAMPLING INSTRUMENTS AND EQUIPMENT CALIBRATION SCHEDULE
As Specified by the CARB

Instrument Type	Frequency of Calibration	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter (large)	12 months	Calibrated dry test meter	± 2% of volume measured
Dry Gas Meter	12 months or when repaired	Calibrated dry test meter	± 2% of volume measured
S-Type Pitot (for use with EPA-type sampling train	6 months	EPA Method 2	Cp constant (+5%) over working range; difference between average Cp for each leg must be less than 2%
Vacuum Gauges Pressure Gauges	6 months	Manometer	± 3%
Field Barometer	6 months	Mercury barometer	± 0.2" Hg
Temperature Measurement	6 months	NBS mercury thermometer or NBS calibrated platinum RTD	± 4°F for <400°F ± 1.5% for >400°F
Temperature Readout Devices	6 months	Precision potentiometer	± 2% full scale reading
Analytical Balance	12 months (cbeck prior to each use)	Should be performed by manufacturer or qualified laboratory	± 0.3 mg of stated weight
Probe Nozzles	12 Months	Nozzle diameter check micrometer	Range < ± 0.10 mm for three measurements
Continuous Analyzers	Depends upon use, frequency and performance	As specified by manufacturers operating manuals, EPA NBS gases and/or reference methods	Satisfy all limits specified in operating specifications

TABLE B-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and Carnot Experience

Equipment	Performance Requirement	Maintenance Interval	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw manufacturer required vacuum and flow	Every 500 hours of operation or 6 months, whichever is less	1. Visual inspection 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	Every 500 hours of operation or 6 months, whichever is less After each test, if used in H_2S sampling or other corrosive atmospheres	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by the manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

Appendix B.2

ARB Certification

State of California
AIR RESOURCES BOARD

Executive Order G-94-028

Approval to Carnot
To Conduct Testing as an Independent Contractor

WHEREAS, the Air Resources Board (ARB), pursuant to Section 41512 of the California Health and Safety Code, has established the procedures contained in Section 91200-91220, Title 17, California Code of Regulations, to allow the use of independent testers for compliance tests required by the ARB; and

WHEREAS, pursuant to Sections 91200-91220, Title 17, California Code of Regulations, the Executive Officer has determined that Carnot meets the requirements of the ARB for conducting ARB Test Methods 1, 2, 3, 4, 5, 6, 8, 10, and 100 (NOx, O2) when the following conditions are met:

1. Carnot conducts ARB Test Method 100 for O2 using a Teledyne 326 analyzer with either a A5 or a B1 sensor, or a paramagnetic analyzer.

NOW, THEREFORE, BE IT ORDERED that Carnot is granted an approval, from the date of execution of this order, until June 30, 1995 to conduct the tests listed above, subject to compliance with Section 91200-91220, Title 17, California Code of Regulations.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his or her authorized representative may field audit one or more tests conducted pursuant to this order for each type of testing listed above.

Executed this 29TH day of JULY 1994, at Sacramento, California.

James J. Morgester, Chief
Compliance Division

STATE OF CALIFORNIA

AIR RESOURCES BOARD
2020 L STREET
P.O. BOX 2815
SACRAMENTO, CA 95812

RECEIVED
JUL 13 1994
CARNOT

PETE WILSON, Governor

July 8, 1994

Mr. Michael L. Schmitt
Carnot
15991 Red Hill Avenue, Suite 110
Tustin, California 92680

Dear Mr. Schmitt:

Testing Approval

We are pleased to inform you that we have renewed your approval to conduct the types of testing listed in the enclosed Executive Order. This approval is valid until June 30, 1995 during which time a field audit of your company's testing ability may be conducted. We have also enclosed a certificate of approval.

Should you have any questions or need further assistance, please contact Ms. Kathryn Gugeler at (916) 327-1521 or Mr. David Tribble at (916) 323-2217. All correspondence should be addressed to me at the post office box above.

Sincerely,

James J. Morgester, Chief
Compliance Division

Enclosures

cc: Mr. Ed Jeung
Department of Health Services
Air and Industrial Hygiene Laboratory
2151 Berkeley Way
Berkeley, California 94704

State of California

Air Resources Board

Approved Independent Contractor

Carnot

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to Section 91207, Title 17, California Code of Regulations, until June 30, 1995, for those test methods listed below:

ARB Source Test Methods:
1, 2, 3, 4, 5, 6, 8, 10, 100(NOx, O2)

James J. Morgester, Chief
Compliance Division

Laura McKinney, Manager
Certification and Investigation Section

Appendix B.3

Calibration Data

CARNOT
SPAN GAS RECORD

CLIENT/LOCATION: UCOS - Colmac DATE: 6/27/98

BY: GS

GAS	SPAN CYLINDER		AUX. SPAN CYLINDER	
	CYLINDER NO.	CONCENTRATION	CYLINDER NO.	CONCENTRATION
ZERO		99.999 %		
NOx	AAL3583	88.54	AAL12400	47.51
O_2	ALM045927	8.937	ALM05739	12.45
CO				
CO_2	ALM 045927	22.43	ALM05739	15.16
SO_2				

CARNOT
INSTRUMENT LINEARITY

	ANALYZER				
	O_2	CO_2	CO	NOx	SO_2
ANALYZER RANGE	0-25	—	—	0-100	—
SET TO HIGH STD (80-90% OF RANGE)	20.9	—	—	88.5	—
ACTUAL VALUE OF LOW STD	12.45	—	—	47.51	—
AS-FOUND LOW STD (50-60% OF RANGE)	12.33	—	—	48.9	—
DIFFERENCE IN % OF FULL SCALE	0.5	—	—	+1.3	—

% ERROR CALCULATION:

$$\frac{\text{(AS FOUND - ACTUAL VALUE OF SPAN)}}{\text{RANGE}} \times 100$$

ALLOWABLE DEVIATION IS 2% OF FULL SCALE (2 SQUARES ON STRIP CHART).

CARNOT

PMF-009

CARNOT
SPAN GAS RECORD

CLIENT/LOCATION: UCOS Colmac DATE: 6-28-94

BY: D.W.

GAS	SPAN CYLINDER		AUX. SPAN CYLINDER	
	CYLINDER NO.	CONCENTRATION	CYLINDER NO.	CONCENTRATION
ZERO				
NOx	AAL3583	88.54	AAL12400	47.51
O_2	ALM-045927	8.937	ALM-739	12.45
CO				
CO_2				
SO_2				

CARNOT
INSTRUMENT LINEARITY

	ANALYZER				
	O_2	CO_2	CO	NOx	SO_2
ANALYZER RANGE	0-25			0-100	
SET TO HIGH STD (80-90% OF RANGE)	20.74			88.5	
ACTUAL VALUE OF LOW STD	12.45			47.51	
AS-FOUND LOW STD (50-60% OF RANGE)	12.55			47.00	
DIFFERENCE IN % OF FULL SCALE	.5%			.5%	

% ERROR CALCULATION:

$$\frac{(\text{AS FOUND} - \text{ACTUAL VALUE OF SPAN})}{\text{RANGE}} \times 100$$

ALLOWABLE DEVIATION IS 2% OF FULL SCALE (2 SQUARES ON STRIP CHART).

CARNOT

PMF-009

CARNOT
CEM PERFORMANCE DATA

CLIENT/LOCATION: UCOS-Colma DATE: 6/28/94

BY: SJ

SYSTEM CONFIGURATION F600				
ANALYZERS IN SERVICE				
ANALYZERS:	O_2	CO_2	CO	NOx
MODEL:	Teledyne	PIR 2000	48	10S
SERIAL NO.:				

PROBE	MAIN	AUX	SAMPLE CONDITIONER	
LENGTH:	6'	4'	CONDENSER-VACUUM SIDE (CHECK FLOW):	✓
LINER MATERIAL:	SS	SS	CONDENSER-PRESSURE SIDE (CHECK FLOW):	✓
HEATED PROBE (Y/N):	NO	NO	CONDENSER TEMPERATURE:	40
HEATED LINE (Y/N):	Yes	Yes	FILTER CONDITION (COND. OR DATE LAST CHANGED):	5/04/94

SAMPLE LINE			SYSTEM LEAK CHECK	MAIN	AUX
LENGTH:	50'	50'	PRE-TEST (cfh):	0.0	0.0
LINER MATERIAL:	teflon	teflon	POST-TEST (cfh):		
SYSTEM BIAS LINE:	teflon	teflon	LEAK RATE (%) = POST-TEST (cfh) / SYSTEM FLOW RATE (cfm) x 60 x 100 = _____ %		

ON-STACK CONDITIONER		NOx CONVERSION EFFICIENCY	
IN SERVICE (Y/N):	Yes	HIGH CAL NOx	
KNOCK-OUT CONDITION (CHECK FLOW):	✓	HIGH CAL NO (AS FOUND)	1
COOLANT:	ICE	LOW CAL NOx	
		LOW CAL NO (AS FOUND)	1

OPERATING CONDITIONS	
SAMPLE PRESSURE:	SYSTEM RESPONSE TIME CHECK
SAMPLE VACUUM:	UPSCALE: _____ sec.
NOx VACUUM:	DOWNSCALE: _____ sec.

CARNOT

PMF-011

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
CARNOT
RICK MADRIGAL
15991 RED HILL AVE
TUSTIN, CA 92680

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 1818
Project # 30380 003

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September 1993.

Cylinder Number ALM045739 Certification Date 03-15-94 Exp. Date 03-15-97
Cylinder Pressure+ 2000 PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(CARBON DIOXIDE)	15.16 %	± 1 % NIST Traceable
(OXYGEN)	12.45 %	
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
GMIS	06-94	A018082	18.97 % CO2 IN N2
GMIS	06-94	A6513	12.45 % O2 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
CO2:Horiba / OPE-135C / 56553902	02-22-94	NDIR
O2:Horiba / OPE-335 / 850557042	02-25-94	Magnetopneumatic

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Carbon Dioxide

First Triad Analysis — Date: 03-15-94 Response Units: mv

Z1= 0.00	R1= 97.0	T1= 85.9
R2= 97.0	Z2= 0.00	T2= 85.8
Z3= 0.00	T3= 85.8	R3= 97.0

Avg. Conc. of Cust Cyl. 15.16 %

Second Triad Analysis — Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Calibration Curve — Concentration= Ax^3+Bx^2+Cx+D
A =0.000007988
B =0.0002062
C =0.1000
D =-0.0001333

Oxygen

First Triad Analysis — Date: 03-15-94 Response Units: mv

Z1= 0.00	R1= 94.1	T1= 49.8
R2= 94.1	Z2= 0.00	T2= 49.8
Z3= 0.00	T3= 49.8	R3= 94.1

Avg. Conc. of Cust Cyl. 12.45 %

Second Triad Analysis — Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Calibration Curve — Concentration= $Ax+B$
A =0.2500
B =-0.004586

Third Triad Analysis — Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Fourth Triad Analysis — Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Concentration=

Special Notes:

ANALYST

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
CARNOT
RICK MADRIGAL
15991 RED HILL AVE
SUITE 110
TUSTIN, CA 92680

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 1914
Project # 30667 009

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards, Procedure G1; September 1993.

Cylinder Number ALM045927 **Certification Date** 03-30-94 **Exp. Date** 03-30-97
Cylinder Pressure+ 1900 PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(CARBON DIOXIDE)	22.43 %	± 1 % NIST Traceable
(OXYGEN)	8.937 %	
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
CRM1675	06-94	ALM001136	14.08 % CO2/N2
GMIS	06-94	A10868	9.520 % O2/N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
CO2:PIR2000-ACUBLEND	03-24-94	NDIR
O2:Horiba / OFE-335 / 850557042	03-30-94	Magnetopneumatic

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components | **First Triad Analysis** | **Second Triad Analysis** | **Calibration Curve**

Carbon Dioxide

First Triad Analysis — Date: 03-30-94 Response Units: mv

Z1= 0.00	R1= 72.9	T1= 92.2
R2= 72.9	Z1= 0.00	T2= 92.2
Z3= 0.00	T3= 92.2	R3= 72.9

Avg. Conc. of Cust Cyl. 22.43 %

Second Triad Analysis — Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Calibration Curve — Concentration= $Ax^4+Bx^3+Cx^2+Dx+E$

A =0.0000001942
B =-0.00001975
C =0.001882
D =0.08535
E =0.002942

Oxygen

First Triad Analysis — Date: 03-30-94 Response Units: mv

Z1= 0.00	R1= 95.3	T1= 89.4
R2= 95.3	Z2= 0.00	T2= 89.4
Z3= 0.00	T3= 89.3	R3= 95.3

Avg. Conc. of Cust Cyl. 8.937 %

Second Triad Analysis — Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Avg. Conc. of Cust Cyl.

Calibration Curve — Concentration= Ax + B

A =0.09999
B =0.0004275

Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

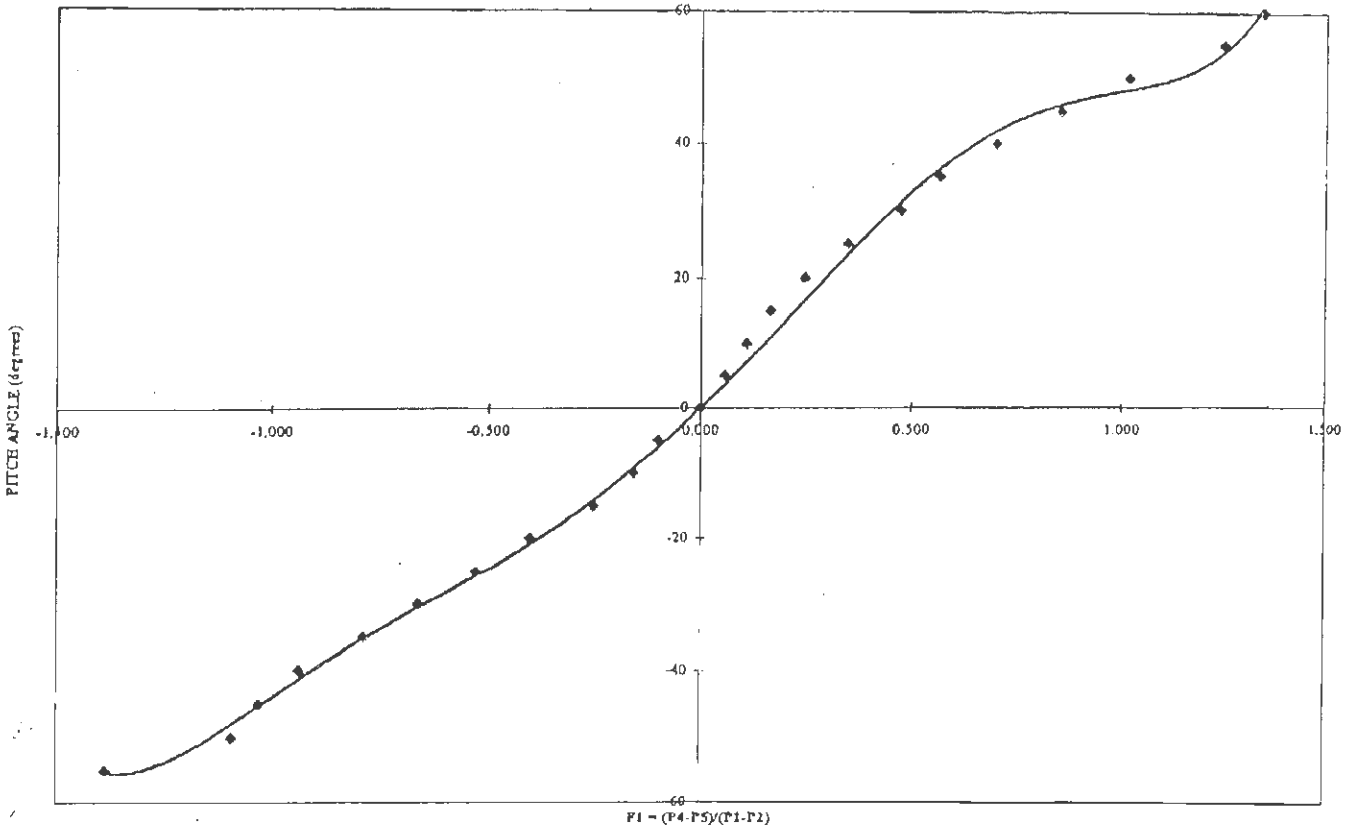
Date: Response Units: mv

Z1=	R1=	T1=
R2=	Z2=	T2=
Z3=	T3=	R3=

Concentration=

Analyst: [signature]

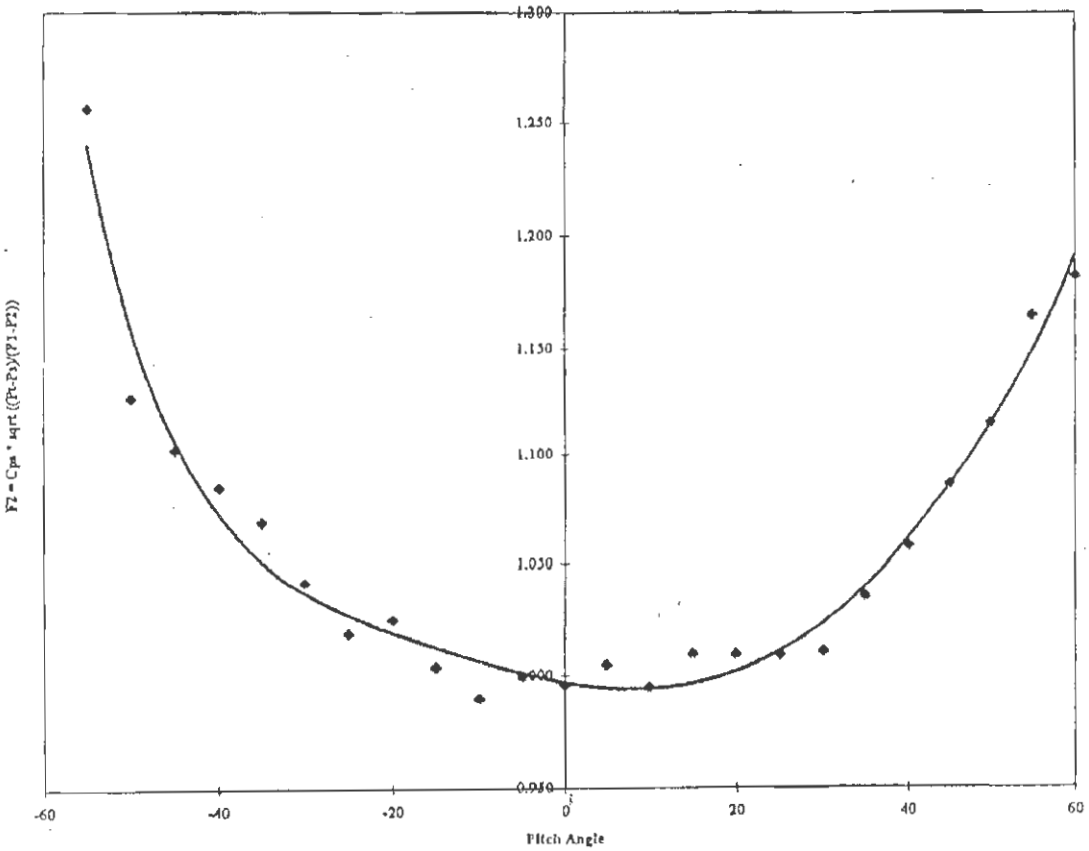
CARNOT
3-DIMENSIONAL VELOCITY PROBE CALIBRATION
PITCH ANGLE vs. F1
PROBE ID: B-2455



Pitch Angle = 63.09X + 23.69X^2 - 24.505X^3 - 33.312X^4 + 7.5203X^5 + 11.669X^6

Performed By: MM/RM
Date: 6/13/94

CARNOT
3-DIMENSIONAL VELOCITY PROBE CALIBRATION
F2 vs. PITCH ANGLE
PROBE ID: B-2455



Performed By: MM/RM
Date: 5/18/94

$F2 = 0.997 - 0.0007X + 3E\text{-}5X^2 + 8E\text{-}7X^3 + 1E\text{-}9X^4 - 3E\text{-}10X^5 + 3E\text{-}12X^6$

APPENDIX C
DATA SHEETS

Appendix C.1

Sample Locations

CARNOT

SAMPLING POINT LOCATION DATA - EPA METHOD 1

PLANT: Ucos - colmac DATA BY: [illegible]

DATE: 6/27/94

TEST LOCATION: Unit 2 Duct

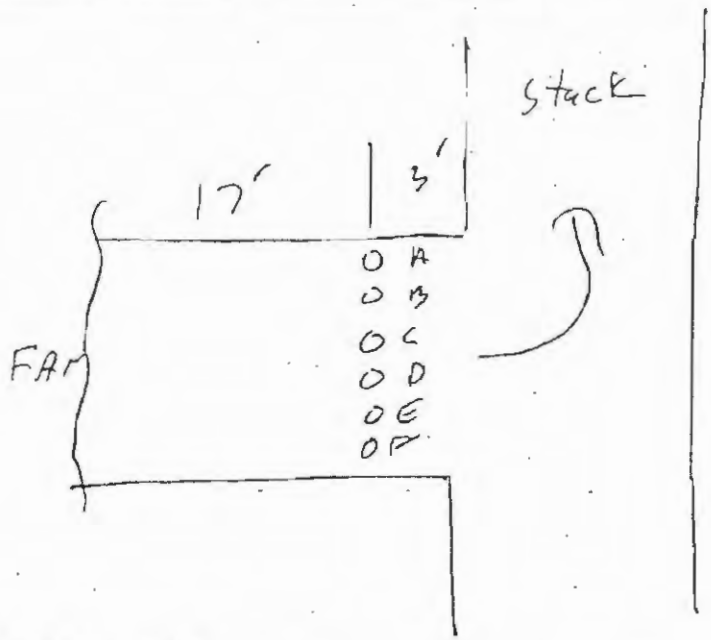


Diagram of Sampling Location

UPSTREAM DIST./DIA.: 17/

DOWNSTREAM DIST./DIA.: 3/

COUPLING LENGTH: 8"

NO. OF SAMPLING PTS.: 42

STACK DIMENSION: 47" x 119"

STACK AREA, FT²: 38.8

SAMPLE POINT	% OF DIAMETER	IN. FROM NEAR WALL	IN. FROM NOZZLE*
1		3.4	11.42
2		10.3	18.3
3		17.14	25.14
4		24.	32
5		30.86	38.86
6		37.7	45.71
7		44.5	52.57

*INCHES FROM WALL PLUS COUPLING LENGTH

CARNOT

PMF-002

Appendix C.2

CEM Data

(1)

CARNOT
CONTINUOUS EMISSIONS MEASUREMENTS

CLIENT: UCOS - Colmac

DATE: 6/28/94

OPERATOR: EP

TEST LOCATION: Unit 1 Outlet

TEST NUMBERS: 1-1- Stmt

AMBIENT TEMP., DB/WB: ~115

BAROMETRIC PRESSURE: 29.80

DUCT STATIC PRESSURE: -0.7

FUEL: Bo Mass

TEST NO.	SAMPLE TIME	SAMPLE POINT/ CONDITION	DRY, UNCORRECTED							CORRECTED TO ___% ___, DRY		
			O_2	O_2	CO	NOx	NO	NO_2	SO_2	CO	NOx	SO_2
		zero / span	.3 / 12.2	.1 / 12.4								
1-1	1218 / 1221	A5	6.9	6.9								
	1221 / 1224	A4	7.2	7.1								
	1224 / 1227	A3	6.7	6.7								
	1227 / 1230	A2	7.0	7.2								
*	1230 / 1233	A1	7.1	8.0								
	1236 / 1239	B5	6.5	6.5								
	1239 / 1242	B4	6.7	6.7								
	1242 / 1245	B3	6.9	6.6								
	1245 / 1248	B2	6.3	6.2								
	1248 / 1251	B1	6.5	6.5								

COMMENTS:

CARNOT

PMF-013

CARNOT
CONTINUOUS EMISSIONS MEASUREMENTS

CLIENT: UCOS - Colmun

DATE: 6/28/94

OPERATOR: EP

TEST LOCATION: Unit 1

TEST NUMBERS: 1-1- Start

AMBIENT TEMP., DB/WB:

BAROMETRIC PRESSURE:

DUCT STATIC PRESSURE:

FUEL: Bio Mass

TEST NO.	SAMPLE TIME	SAMPLE POINT/ CONDITION	REF DRY, UNCORRECTED							CORRECTED TO ___% ___, DRY		
			O_2	O_2	CO	NOx	NO	NO_2	SO_2	CO	NOx	SO_2
	1254/1257	C5	6.6	6.5								
	1257/1300	C4	6.3	6.2								
	1300/1303	C3	6.4	6.4								
	1303/1306	C2	6.9	6.8								
	1306/1309	C1	6.7	6.7								
	1312/1315	D5	6.7	6.6								
	1315/1318	D4	6.9	6.8								
	1318/1321	D3	6.7	6.7								
	1321/1324	D2	6.6	6.6								
	1324/1327	D1	6.7	6.7								

COMMENTS:

CARNOT

PMF-013

(5)

CARNOT
CONTINUOUS EMISSIONS MEASUREMENTS

CLIENT: UWS-Colmac

DATE: 6/28/94

OPERATOR: SG

TEST LOCATION: Unit 2 Outlet

TEST NUMBERS: 1-1- Straw

AMBIENT TEMP., DB/WB:

BAROMETRIC PRESSURE:

DUCT STATIC PRESSURE:

FUEL:

TEST NO.	SAMPLE TIME	SAMPLE POINT/ CONDITION	DRY, UNCORRECTED							CORRECTED TO ___% ___, DRY		
			O_2	Ref O_2	CO	NOx	NO	NO_2	SO_2	CO	NOx	SO_2
1-1	1330/1333	E-5	7.0	6.9								
	1333/1336	E-4	6.6	6.6								
	1336/1339	E-3	6.6	6.6								
	1339/1342	E-2	6.9	6.8								
	1342/1345	E-1	6.7	6.6								
	1348/1351	F-5	6.5	6.5								
	1351/1354	F-4	6.2	6.2								
	1354/1357	F-3	6.8	6.8								
	1357/1400	F-2	6.8	6.8								
	1400/1403	F-1	6.8	6.8								
	1400/1409	A-1	6.5	6.5								
	SYS	Zero/SPAN	.34/12.1	.1/12.1								

COMMENTS:

CARNOT

PMF-013

CARNOT
CONTINUOUS EMISSIONS MEASUREMENTS

CLIENT: UCOS - Colmac

DATE: 6/28/94

OPERATOR: EF

TEST LOCATION: 2-2-CEM

TEST NUMBERS:

AMBIENT TEMP., DB/WB:

BAROMETRIC PRESSURE:

DUCT STATIC PRESSURE:

FUEL:

TEST NO.	SAMPLE TIME	SAMPLE POINT/ CONDITION	DRY, UNCORRECTED							CORRECTED TO ____% ____, DRY		
			O_2	O_2 REF	CO	NOx	NO	NO_2	SO_2	CO	NOx	SO_2
	SYS	zero / span	.3 / 12.2	.1 / 12.4								
	933 / 936	F5	7.0	7.0								
	936 / 939	F4	6.4	6.5								
	939 / 942	F3	7.3	7.4								
	942 / 945	F2	7.0	7.0								
	945 / 948	F1	6.7	6.7								
	951 / 954	E5	6.5	6.5								
	954 / 957	E-4	6.7	6.8								
	957 / 1000	E-3	7.1	7.1								
	1000 / 1003	E-2	6.9	7.0								
	1003 / 1006	E-1	6.7	6.8								

COMMENTS:

CARNOT

PMF-013

CARNOT
CONTINUOUS EMISSIONS MEASUREMENTS

CLIENT: UCOS - Colmac

DATE: 6/28/94

OPERATOR: EC

TEST LOCATION:

TEST NUMBERS:

AMBIENT TEMP., DB/WB:

BAROMETRIC PRESSURE:

DUCT STATIC PRESSURE:

FUEL:

TEST NO.	SAMPLE TIME	SAMPLE POINT/ CONDITION	DRY, UNCORRECTED							CORRECTED TO ____% ____, DRY		
			O_2	Ref O_2	CO	NOx	NO	NO_2	SO_2	CO	NOx	SO_2
2-2	1009/1012	D-5	6.9	7.0								
	1012/1015	D-4	6.3	6.4								
	1015/1018	D-3	7.2	7.2								
	1018/1021	D-2	7.7	7.7								
	1021/1024	D-1	7.0	7.0								
	1033/1036	C-5	6.5	6.4								
	1036/1039	C-4	6.6	6.6								
	1039/1042	C-3	6.5	6.6								
	1042/1045	C-2	6.4	6.4								
	1045/1048	C-1	7.4	7.5								

COMMENTS:

CARNOT

PMF-013

CARNOT
CONTINUOUS EMISSIONS MEASUREMENTS

CLIENT: VCOS - Colmac

DATE: 6/28/96

OPERATOR: GG

TEST LOCATION: outlet #2

TEST NUMBERS: 2-2-ST

AMBIENT TEMP., DB/WB: 105

BAROMETRIC PRESSURE: 29.92

DUCT STATIC PRESSURE:

FUEL: Bio Mass

TEST NO.	SAMPLE TIME	SAMPLE POINT/ CONDITION	DRY, UNCORRECTED							CORRECTED TO ___% ___ DRY		
			Ref O_2	O_2	CO	NOx	NO	NO_2	SO_2	CO	NOx	SO_2
	1051/1054	B-5	6.0	6.1				-				
	1054/1057	B-4	6.2	6.3								
	1057/1100	B-3	6.5	6.6								
	1100/1103	B-2	6.7	6.8								
	1103/1106	B-1	6.6	6.7								
	1109/1112	A-5	7.1	7.3								
	1112/1115	A-4	6.7	6.9								
	1115/1118	A-3	7.4	7.5								
	1118/1121	A-2	6.7	6.8								
	1121/1124	A-1	6.4	6.6								
	GAS	200 SPAN	.3/12.2	.1/12.4								

COMMENTS:

CARNOT

PMF-013

Appendix C.3

3D Flow Data

CARNOT

3-DIMENSIONAL VELOCITY DATA

Client/Location: UCOS Colmac

Sample Location: Unit 1 outlet

Unit No: 1

Test No: 1-3-BD-traverse

Barometric Pressure (in Hg):

Static Pressure in Stack (iwg):

Date: 6-28-94

Data Taken By: Dave Wimley

Test Description: 3-D traverse

Pitot I.D. No.:

Pre-Test Leak Check: o.k

Post-Test Leak Check: O.K

Time	Port	Point	Yaw Angle (Degrees)	Velocity (P1-P2)	Pitch (P4-P5)	Temperature (F)
	D	7	-10	.45	0	413
		6	-6	.47	0	413
		5	-5	.43	+.01	414
1215		4	0	.40	+.01	414
		3	-1	.39	+.01	416
		2	0	.34	+0	416
		1	0	.31	+.01	415
	BC	7	-10	.4	-.04	415
	BC	6	-10	.35	-.02	416
		5	-5	.37	-0.0	416
		4	0	.35	0	417
		3	+5	.41	+.01	417
		2	+8	.4	+.02	417
		1	+10	.33	+.03	417
	B	7	-5	.56	0	416
		6	-10	.57	0	417
		5	-6	.48	0	417
		4	-8	.34	-.02	417
		3	0	.26	+.03	417
		2	+7	.26	+.03	417
		1	+8	.28	+.01	417

Note: Clockwise rotation of the probe corresponds to a positive yaw angle: > 0 or > 90 degrees.

3D_DATA.XLS
2/14/94
8:03 PM

CARNOT

3-DIMENSIONAL VELOCITY DATA

Client/Location: UCOS Colmac

Date: 6-28

Sample Location: unit 1 outlet

Data Taken By: Dave W.

Unit No: 1

Test Description: 3-D traverse

Test No: 1-3-3D-traverse

Pitot I.D. No.:

Barometric Pressure (in Hg): 29.80

Pre-Test Leak Check

Static Pressure in Stack (iwg):

Post-Test Leak Check:

Time	Port	Point	Yaw Angle (Degrees)	Velocity (P1-P2)	Pitch (P4-P5)	Temperature (F)
	A	7	-10	.59	-.03	415
		6	-8	.48	-.03	416
		5	-6	.48	-.03	418
		4	0	.5	-.05	418
		3	0	.57	-.04	419
		2	0	.6	-.05	419
		1	0	.6	-.03	419
	E	7	~~+5~~	.53	.0	419
		6	-8	.55	0	420
		5	0	.56	0	420
		4	0	.6	0	420
		3	-3	.58	0	420
		2	-2	.6	-.03	420
		1	-2	.58	.02	420
	C	7	-4	.5	-.01	418
		6	0	.6	-.03	418
		5	+2	.55	-.04	419
		4	0	.52	-.04	419
		3	0	.62	-.04	419
		2	0	.62	-.04	419
		1	0	.60	-.03	419

Note: Clockwise rotation of the probe corresponds to a positive yaw angle: > 0 or > 90 degrees.

3D_DATA.XLS
2/14/94
8:03 PM

CARNOT

3-DIMENSIONAL VELOCITY DATA

Client/Location: UCCS

Date: 8-28-94

Sample Location: Unit 2 outlet

Data Taken By: D. W

Unit No: 2

Test Description: 3-D

Test No: 2-2-3D

Pitot I.D. No.:

Barometric Pressure (in Hg):

Pre-Test Leak Check

Static Pressure in Stack (iwg): -0.75

Post-Test Leak Check:

Time	Port	Point	Yaw Angle (Degrees)	Velocity (P1-P2)	Pitch (P4-P5)	Temperature (F)
1035	A	7	-6	.55	-.05	439
		6	-9	.45	-.05	439
		5	-12	.45	-.05	439
		4	-3	.5	-.05	439
		3	-9	.6	-.04	439
		2	-8	.6	-.05	439
		1	-8	.55	-.00	440
	B	7	+5	.7	-.00	439
		6	-7	.65	0	439
		5	0	.57	0	439
		4	-1	.48	0	439
		3	-2	.72	0	439
		2	-3	.25	0	438
		1	-15	.27	-.02	438
	C	7	0	.41	-.01	437
		6	0	.42	-.02	436
		5	0	.37	-.01	437
		4	-2	.37	+.01	437
		3	-6	.36	+.02	437
		2	-7	.4	+.02	437
		1	-9	.36	+.02	437

Note: Clockwise rotation of the probe corresponds to a positive yaw angle: > 0 or > 90 degrees.

3D_DATA.XLS
2/14/94
8:03 PM

CARNOT

3-DIMENSIONAL VELOCITY DATA

Client/Location: UCOS Colmac

Date: 6-27-94

Sample Location: Outlet

Data Taken By: Dave Wonderly

Unit No: 2

Test Description: 3-D

Test No: 2-2-3D-Vel

Pitot I.D. No.:

Barometric Pressure (in Hg): 29.32

Pre-Test Leak Check: O.K.

Static Pressure in Stack (in.g):

Post-Test Leak Check: O.K.

Time	Port	Point	Yaw Angle (Degrees)	Velocity (P1-P2)	Pitch (P4-P5)	Temperature (F)
	F	7	-7°	.55	-.05	
		6	-7°	.57	-.04	440
		5	-7°	.50	-.06	441
		4	-6°	.59	-.03	443
		3	-1	.66	-.03	441
		2	-8°	.60	0	442
		1	-10	.52	+.07	445
	E	7	-9°	.52	0	441
		6	-10°	.52	+.01	442
		5	-5°	.54	+.02	442
		4	-7°	.55	0	442
		3	-3°	.53	0	441
		2	-9°	.53	0	441
		1	-10°	.55	+.02	440
	D	7	0	.49	0	440
		6	+1	.45	+.02	438
		5	-2	.42	+.02	437
		4	0	.39	+.01	437
		3	0	.36	0	437
		2	-3°	.30	-.01	437
		1	+2	.25	0	437

Note: Clockwise rotation of the probe corresponds to a positive yaw angle: > 0 or > 90 degrees.

3D_DATA.XLS
2/14/94
8:03 PM

APPENDIX D
CALCULATIONS

3D VELOCITY - DATA AND WORKSHEET

Client:	UCOS COLMAC	Date:	
Unit:	# 1	Data By:	EF
Sample Location:	Outlet duct	Baro. Pressure, in Hg.:	29.90
Test No.:	1-1-3d	Static Pressure, in WG:	-0.78
Probe ID No.:	B-2131	Abs. Pressure, in Hg.:	29.84
Unit Load:		Average O2, % dry:	6.70
Test Date:	6/28/94	Average CO2, % dry:	12.00
Time (Start/Stop):	0950/1145	Moisture Content, %:	15.00
		Molecular Weight, wet:	28.36

Sample Point		Yaw Angle deg.	Pitch P4-P5 in WG	Total P1-P2 in WG	Stack Temp. F	P4-P5/ P1-P2 in WG	Pitch Angle deg.	Pt-Ps/ P1-P2 in WG	Pt-Ps in WG	Result Angle deg.	Velocity uncorr.* fps	Velocity Axial fps
A	7	-10	-0.03	0.58	415	-0.05	-3.2	1.00	0.58	10.5	66.1	65.0
A	6	-8	-0.03	0.48	416	-0.06	-3.8	1.00	0.48	8.9	60.2	59.4
A	5	-6	-0.03	0.48	418	-0.06	-3.8	1.00	0.48	7.1	60.2	59.8
A	4	0	-0.05	0.50	418	-0.10	-6.1	1.00	0.50	6.1	61.5	61.2
A	3	0	-0.04	0.57	419	-0.07	-4.3	1.00	0.57	4.3	65.7	65.5
A	2	0	-0.05	0.60	419	-0.08	-5.1	1.00	0.60	5.1	67.4	67.2
A	1	0	-0.03	0.60	419	-0.05	-3.1	1.00	0.60	3.1	67.4	67.3
E	7	-5	0.00	0.53	419	0.00	0.0	1.00	0.53	5.0	63.2	63.0
E	6	-8	0.00	0.55	420	0.00	0.0	1.00	0.55	8.0	64.4	63.8
E	5	0	0.00	0.56	420	0.00	0.0	1.00	0.56	0.0	65.0	65.0
E	4	0	0.00	0.60	420	0.00	0.0	1.00	0.60	0.0	67.3	67.3
E	3	-3	0.00	0.58	420	0.00	0.0	1.00	0.58	3.0	66.2	66.1
E	2	-2	0.03	0.60	420	0.05	3.2	1.00	0.60	3.8	67.2	67.1
E	1	-2	0.02	0.58	420	0.03	2.2	1.00	0.58	3.0	66.1	66.0
F	7	-4	-0.01	0.50	418	-0.02	-1.3	1.00	0.50	4.2	61.4	61.2
F	6	0	-0.03	0.60	418	-0.05	-3.1	1.00	0.60	3.1	67.3	67.2
F	5	2	-0.04	0.55	419	-0.07	-4.5	1.00	0.55	4.9	64.5	64.3
F	4	0	-0.04	0.52	419	-0.08	-4.7	1.00	0.52	4.7	62.8	62.5
F	3	0	-0.04	0.62	419	-0.06	-4.0	1.00	0.62	4.0	68.5	68.3
F	2	0	-0.04	0.62	419	-0.06	-4.0	1.00	0.62	4.0	68.5	68.3
F	1	0	-0.03	0.60	419	-0.05	-3.1	1.00	0.60	3.1	67.4	67.3
D	7	-10	0.00	0.45	413	0.00	0.0	1.00	0.45	10.0	58.1	57.2
D	6	-6	0.01	0.47	413	0.02	1.4	1.00	0.47	6.2	59.3	59.0
D	5	-5	0.01	0.43	414	0.02	1.5	1.00	0.43	5.2	56.8	56.5
D	4	0	0.01	0.40	414	0.03	1.6	1.00	0.40	1.6	54.7	54.7
D	3	1	0.01	0.39	416	0.03	1.6	1.00	0.39	1.9	54.1	54.1
D	2	0	0.00	0.34	416	0.00	0.0	1.00	0.34	0.0	50.6	50.6
D	1	0	0.01	0.31	415	0.03	2.1	1.00	0.31	2.1	48.2	48.2
C	7	-10	-0.04	0.40	415	-0.10	-6.1	1.00	0.40	11.7	54.9	53.8
C	6	-10	-0.02	0.35	416	-0.06	-3.5	1.00	0.35	10.6	51.4	50.5
C	5	-5	0.00	0.37	416	0.00	0.0	1.00	0.37	5.0	52.7	52.5
C	4	0	0.00	0.35	417	0.00	0.0	1.00	0.35	0.0	51.3	51.3
C	3	5	0.01	0.41	417	0.02	1.6	1.00	0.41	5.2	55.5	55.3
C	2	8	0.02	0.40	417	0.05	3.2	1.00	0.40	8.6	54.8	54.2
C	1	10	0.03	0.33	417	0.09	5.9	0.99	0.33	11.6	49.8	48.7
B	7	-9	0.00	0.58	416	0.00	0.0	1.00	0.58	9.0	66.0	65.2
B	6	-10	0.00	0.57	417	0.00	0.0	1.00	0.57	10.0	65.5	64.5
B	5	-6	0.00	0.48	417	0.00	0.0	1.00	0.48	6.0	60.1	59.8
B	4	-8	0.02	0.34	417	0.06	3.8	0.99	0.34	8.8	50.5	49.9
B	3	0	0.03	0.26	417	0.12	7.6	0.99	0.26	7.6	44.2	43.8
B	2	7	0.03	0.26	417	0.12	7.6	0.99	0.26	10.3	44.2	43.5
B	1	8	0.01	0.28	417	0.04	2.3	1.00	0.28	8.3	45.9	45.4

RESULTS

0.48

Yaw Angle:	2.0 degrees	Stack Temperature:	417 F
Pitch Angle:	-0.4 degrees	Velocity*:	59.45 fps (feet per sec.)
Resultant Angle:	5.6 degrees	Axial Velocity:	59.08 fps
Standard Deviation:	3.3 degrees		

*velocity in the direction of flow

CARNOT
15991 Red Hill Ave., Suite 110
714-259-9520
FAX 714-259-0372

STRATIFICATION CHECK

Client: UCOS COLMAC
Project #: 1409-40950
Unit No: 1.0
Date: 6/28/94

Point	O_2 pt	Ref O_2	% Diff	Point	O_2 pt	Ref O_2	% Diff
A5	6.9	6.9	0.0%	D5	6.5	6.4	-1.6%
A4	7.2	7.1	-1.4%	D4	6.6	6.6	0.0%
A3	6.7	6.7	0.0%	D3	6.7	6.7	0.0%
A2	7.0	7.2	2.8%	D2	6.6	6.6	0.0%
A1	6.5	6.5	0.0%	D1	6.7	6.7	0.0%
B5	6.5	6.5	0.0%	E5	7.0	6.9	-1.4%
B4	6.7	6.7	0.0%	E4	6.6	6.6	0.0%
B3	6.7	6.6	-1.5%	E3	6.6	6.6	0.0%
B2	6.3	6.2	-1.6%	E2	6.9	6.8	-1.5%
B1	6.5	6.5	0.0%	E1	6.7	6.6	-1.5%
C5	6.6	6.5	-1.5%	F5	6.5	6.5	0.0%
C4	6.3	6.2	-1.6%	F4	6.2	6.2	0.0%
C3	6.4	6.4	0.0%	F3	6.8	6.8	0.0%
C2	6.9	6.8	-1.5%	F2	6.8	6.8	0.0%
C1	6.7	6.7	0.0%	F1	6.8	6.8	0.0%

O2 Stratification= -0.4%

CARNOT
15991 Red Hill Ave. Suite 110
Tustin, California 92680
714-259-9520
FAX 714-259-0372

3D VELOCITY - DATA AND WORKSHEET

Client:	UCOS COLMAC	Date:	
Unit:	# 2	Data By:	EF
Sample Location:	Outlet duct	Baro. Pressure, in Hg.:	29.90
Test No.:	2-2-3d	Static Pressure, in WG:	-0.78
Probe ID No.:	B-2131	Abs. Pressure, in Hg.:	29.84
Unit Load:		Average O2, % dry:	6.70
Test Date:	6/28/94	Average CO2, % dry:	12.00
Time (Start/Stop):	0950/1145	Moisture Content, %:	15.00
		Molecular Weight, wet:	28.36

Sample Point		Yaw Angle deg.	Pitch P4-P5 in WG	Total P1-P2 in WG	Stack Temp. F	P4-P5/ P1-P2 in WG	Pitch Angle deg.	Pt-Ps/ P1-P2 in WG	Pt-Ps in WG	Result Angle deg.	Velocity uncorr.* fps	Axial fps
A	7	-6	-0.05	0.55	439	-0.09	-5.5	1.00	0.55	8.1	65.3	64.6
A	6	-9	-0.05	0.45	439	-0.11	-6.7	1.00	0.45	11.2	59.1	58.0
A	5	-12	-0.05	0.45	439	-0.11	-6.7	1.00	0.45	13.7	59.1	57.4
A	4	-3	-0.05	0.50	439	-0.10	-6.1	1.00	0.50	6.8	62.3	61.8
A	3	-9	-0.04	0.60	439	-0.07	-4.1	1.00	0.60	9.9	68.1	67.1
A	2	-8	-0.05	0.60	439	-0.08	-5.1	1.00	0.60	9.5	68.2	67.3
A	1	-8	0.00	0.55	440	0.00	0.0	1.00	0.55	8.0	65.2	64.5
B	7	5	0.00	0.70	439	0.00	0.0	1.00	0.70	5.0	73.5	73.2
B	6	-3	0.00	0.65	439	0.00	0.0	1.00	0.65	3.0	70.8	70.7
B	5	0	0.00	0.57	439	0.00	0.0	1.00	0.57	0.0	66.3	66.3
B	4	-1	0.00	0.48	439	0.00	0.0	1.00	0.48	1.0	60.9	60.8
B	3	-2	0.00	0.32	439	0.00	0.0	1.00	0.32	2.0	49.7	49.7
B	2	-3	0.00	0.25	438	0.00	0.0	1.00	0.25	3.0	43.9	43.8
B	1	-15	-0.02	0.27	438	-0.07	-4.5	1.00	0.27	15.7	45.7	44.0
C	7	0	-0.01	0.41	437	-0.02	-1.5	1.00	0.41	1.5	56.2	56.2
C	6	0	-0.02	0.42	436	-0.05	-2.9	1.00	0.42	2.9	56.9	56.8
C	5	0	-0.02	0.37	437	-0.05	-3.3	1.00	0.37	3.3	53.4	53.3
C	4	-2	-0.01	0.37	437	-0.03	-1.7	1.00	0.37	2.6	53.4	53.3
C	3	-6	0.02	0.36	437	0.06	3.6	0.99	0.36	7.0	52.6	52.2
C	2	-3	0.02	0.40	437	0.05	3.2	1.00	0.40	4.4	55.4	55.3
C	1	-9	0.02	0.36	437	0.06	3.6	0.99	0.36	9.7	52.6	51.8
F	7	-7	-0.05	0.55	440	-0.09	-5.5	1.00	0.55	8.9	65.3	64.5
F	6	-3	-0.04	0.53	440	-0.08	-4.6	1.00	0.53	5.5	64.1	63.8
F	5	-6	-0.06	0.50	441	-0.12	-7.2	1.00	0.50	9.4	62.4	61.5
F	4	-1	-0.03	0.59	443	-0.05	-3.1	1.00	0.59	3.3	67.7	67.6
F	3	-8	-0.03	0.66	441	-0.05	-2.8	1.00	0.66	8.5	71.5	70.7
F	2	-10	0.00	0.60	442	0.00	0.0	1.00	0.60	10.0	68.1	67.1
F	1	-9	0.07	0.52	445	0.13	8.9	0.99	0.52	12.6	63.4	61.9
E	7	-10	0.00	0.52	441	0.00	0.0	1.00	0.52	10.0	63.4	62.4
E	6	-5	0.01	0.52	442	0.02	1.2	1.00	0.52	5.1	63.4	63.2
E	5	-7	0.02	0.54	442	0.04	2.4	1.00	0.54	7.4	64.6	64.1
E	4	-3	0.00	0.55	441	0.00	0.0	1.00	0.55	3.0	65.2	65.1
E	3	-9	0.00	0.53	441	0.00	0.0	1.00	0.53	9.0	64.0	63.2
E	2	-10	0.00	0.53	441	0.00	0.0	1.00	0.53	10.0	64.0	63.0
E	1	0	0.02	0.55	440	0.04	2.3	1.00	0.55	2.3	65.1	65.1
D	7	1	0.00	0.49	440	0.00	0.0	1.00	0.49	1.0	61.5	61.5
D	6	-2	0.02	0.45	438	0.04	2.8	1.00	0.45	3.5	58.8	58.7
D	5	0	0.02	0.42	437	0.05	3.1	1.00	0.42	3.1	56.8	56.7
D	4	0	0.01	0.39	437	0.03	1.6	1.00	0.39	1.6	54.8	54.7
D	3	0	0.00	0.36	437	0.00	0.0	1.00	0.36	0.0	52.6	52.6
D	2	-3	-0.01	0.30	437	-0.03	-2.1	1.00	0.30	3.6	48.1	48.0
D	1	2	0.00	0.25	437	0.00	0.0	1.00	0.25	2.0	43.9	43.8

RESULTS

Yaw Angle:	4.4	degrees	Stack Temperature:	439	F
Pitch Angle:	-1.0	degrees	Velocity*:	60.18	fps (feet per sec.)
Resultant Angle:	5.9	degrees	Axial Velocity:	59.71	fps
Standard Deviation:	4.0	degrees			

*velocity in the direction of flow

CARNOT
15991 Red Hill Ave., Suite 110
Tustin, California 92680
714-259-9520
FAX 714-259-0372

STRATIFICATION CHECK

Client: UCOS COLMAC
Project #: 1409-40985
Unit No: 2
Date: 6/28/94

Point	O_2 pt	Ref O_2	% Diff	Point	O_2 pt	Ref O_2	% Diff
F5	7.0	7.0	0.0%	C5	6.5	6.4	-1.6%
F4	6.4	6.5	1.5%	C4	6.6	6.6	0.0%
F3	7.3	7.4	1.4%	C3	6.5	6.6	1.5%
F2	7.0	7.0	0.0%	C2	6.4	6.4	0.0%
F1	6.7	6.7	0.0%	C1	7.4	7.5	1.3%
E5	6.5	6.5	0.0%	B5	6.0	6.1	1.6%
E4	6.7	6.8	1.5%	B4	6.2	6.3	1.6%
E3	7.1	7.1	0.0%	B3	6.5	6.6	1.5%
E2	6.9	7.0	1.4%	B2	6.7	6.8	1.5%
E1	6.7	6.8	1.5%	B1	6.6	6.7	1.5%
D5	6.9	7.0	1.4%	A5	7.1	7.3	2.7%
D4	6.3	6.4	1.6%	A4	6.7	6.9	2.9%
D3	7.2	7.2	0.0%	A3	7.4	7.5	1.3%
D2	7.7	7.7	0.0%	A2	6.7	6.8	1.5%
D1	7.0	7.0	0.0%	A1	6.4	6.6	3.0%

O2 Stratification= 1.0%

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Tustin, California 92680
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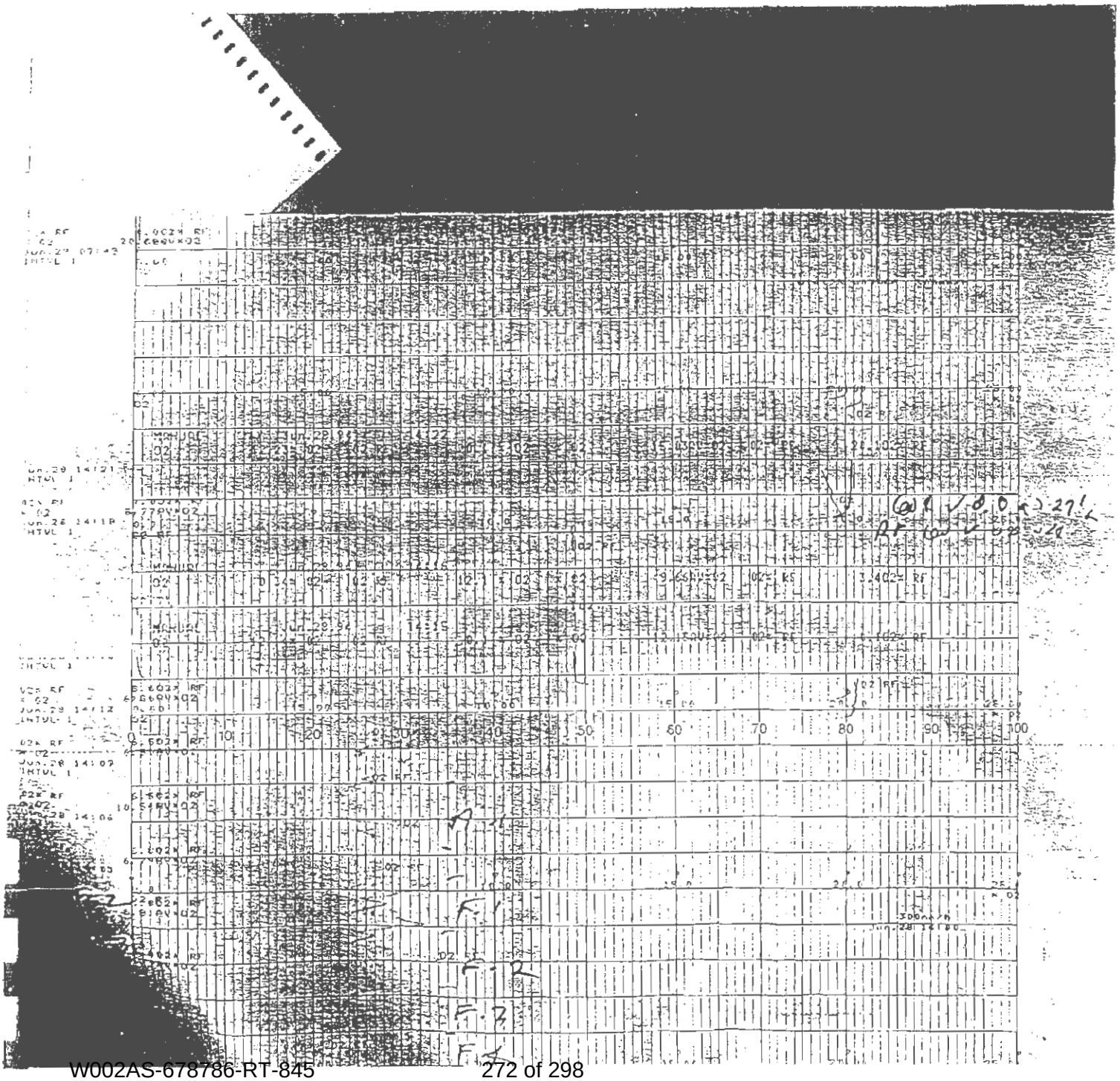
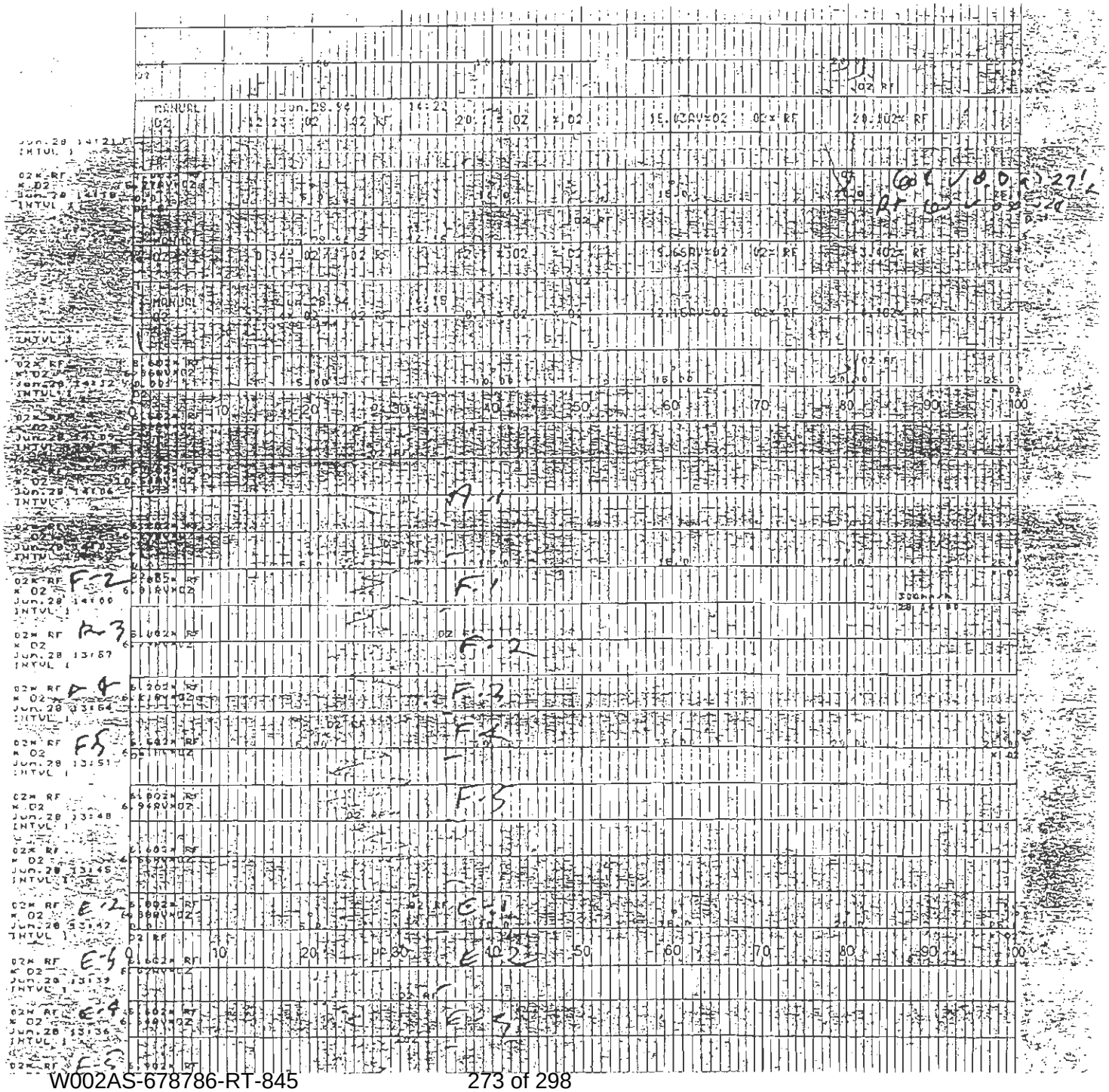
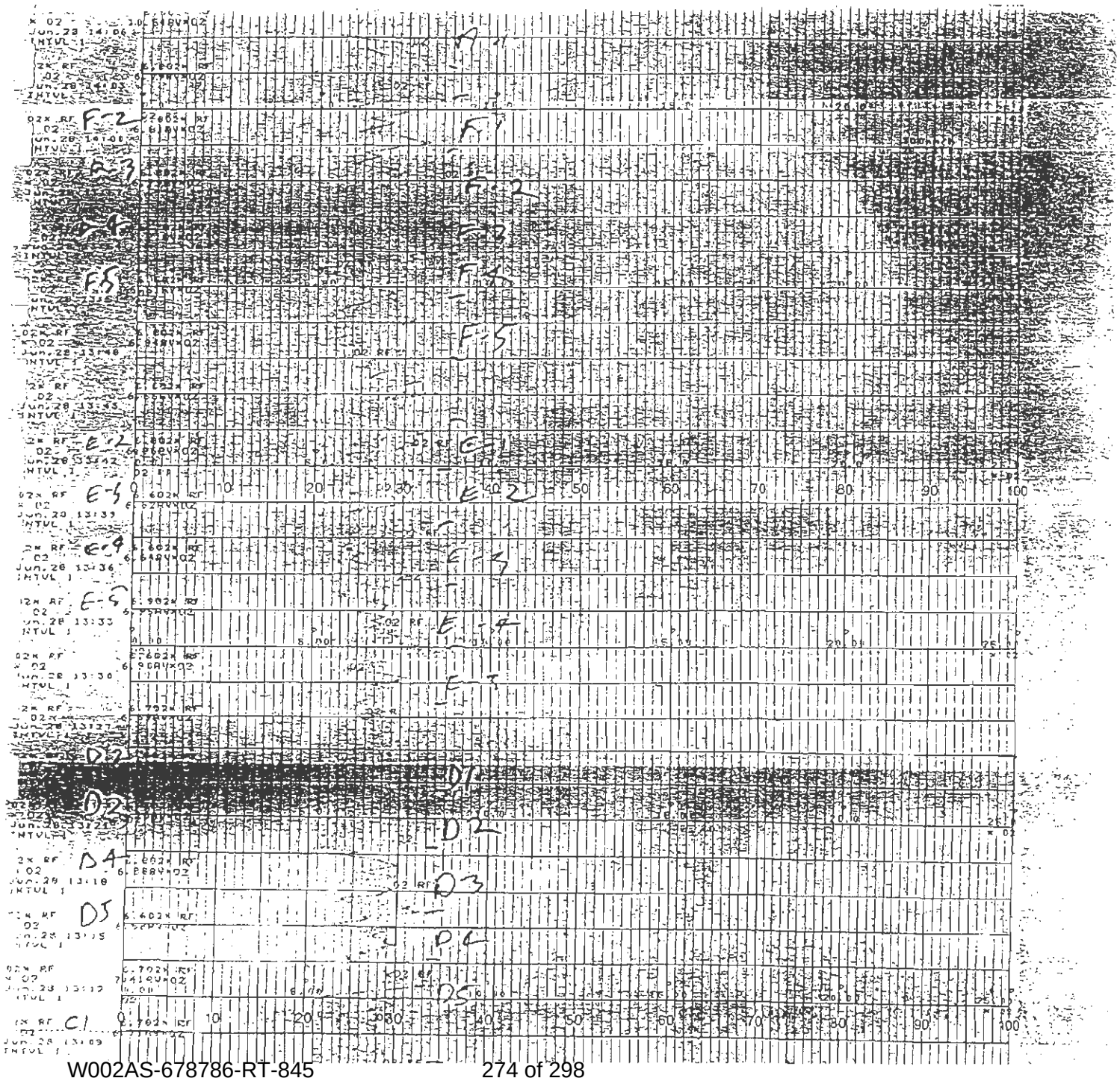
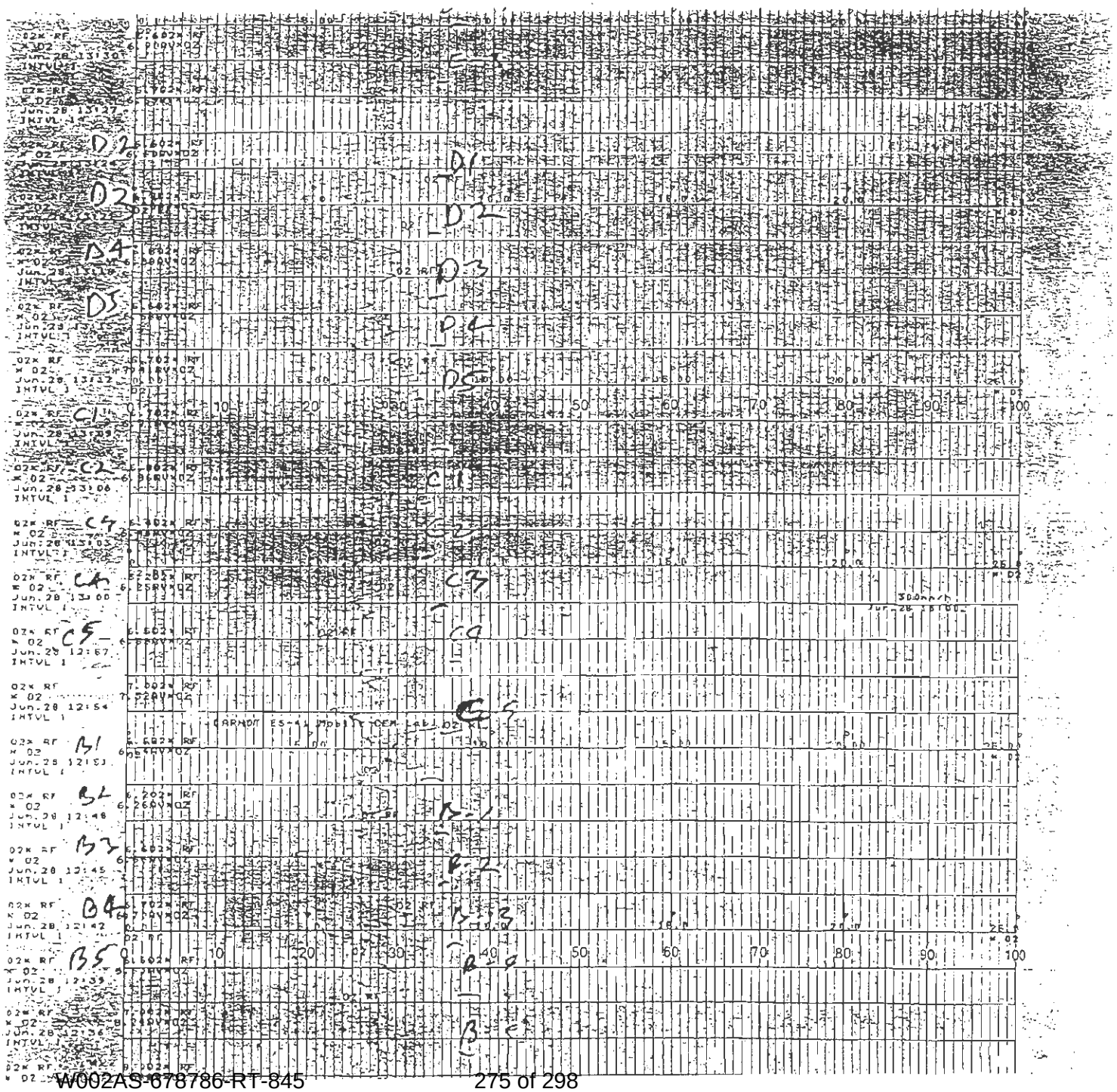
APPENDIX E

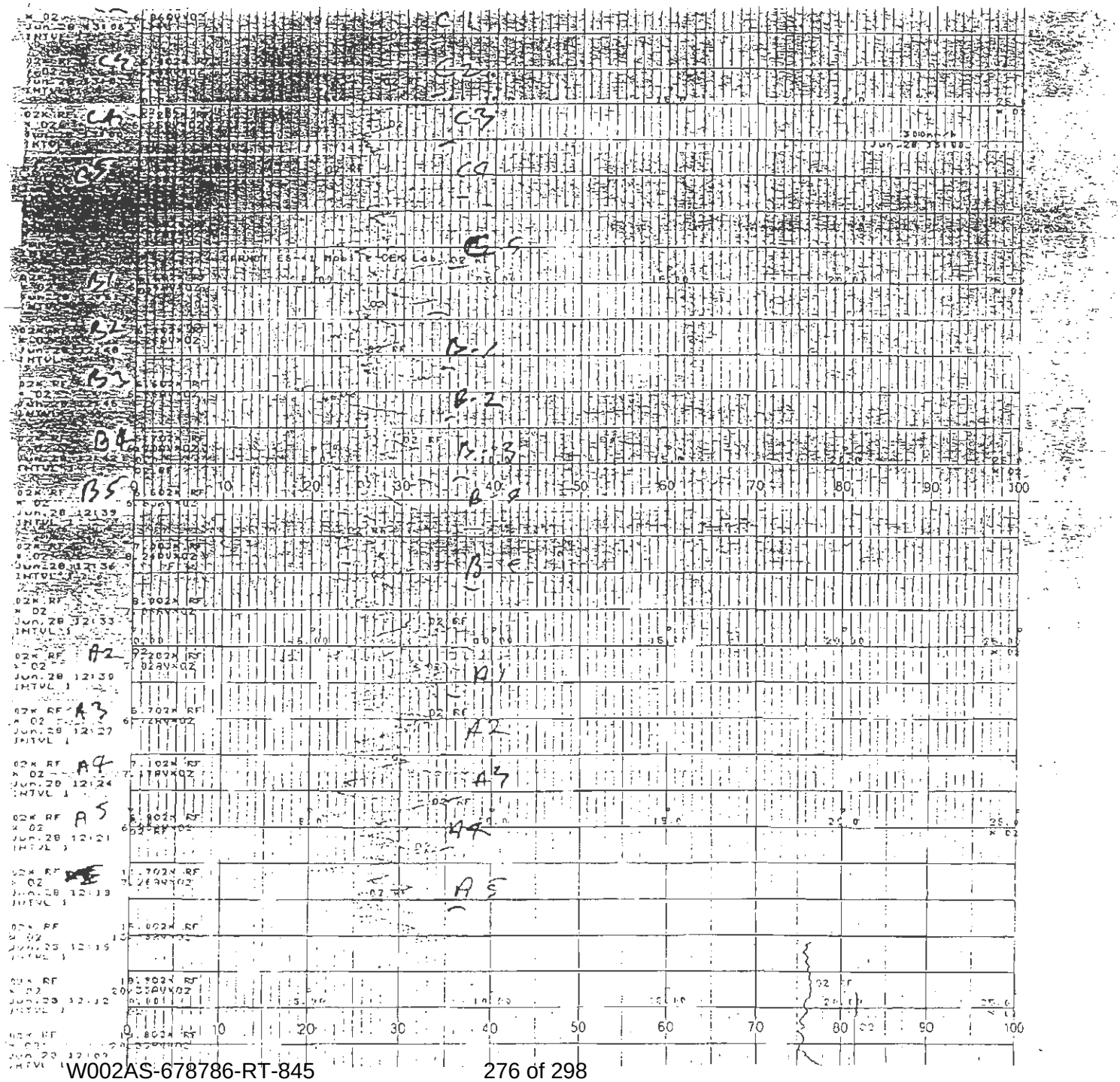
STRIP CHARTS

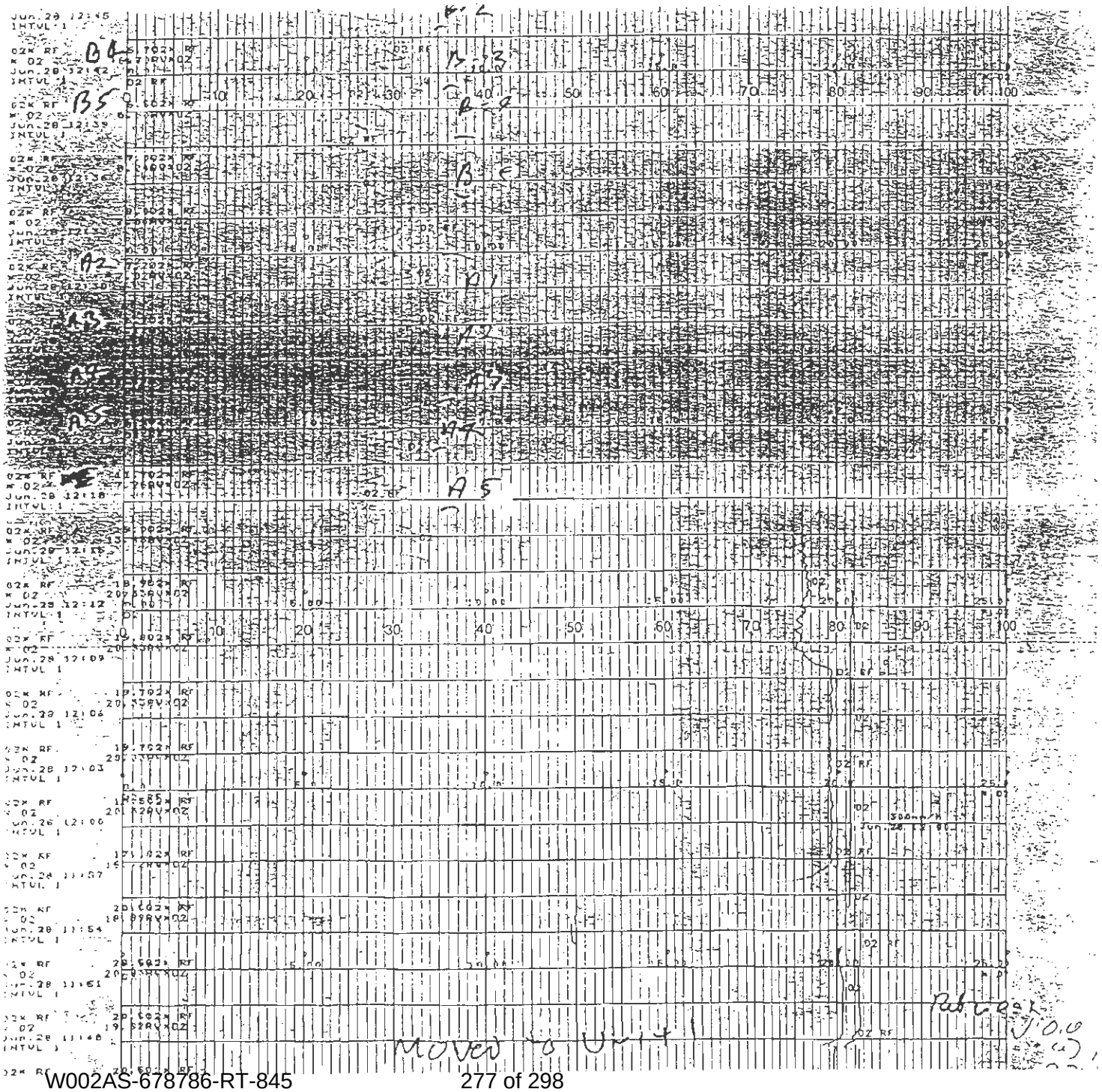


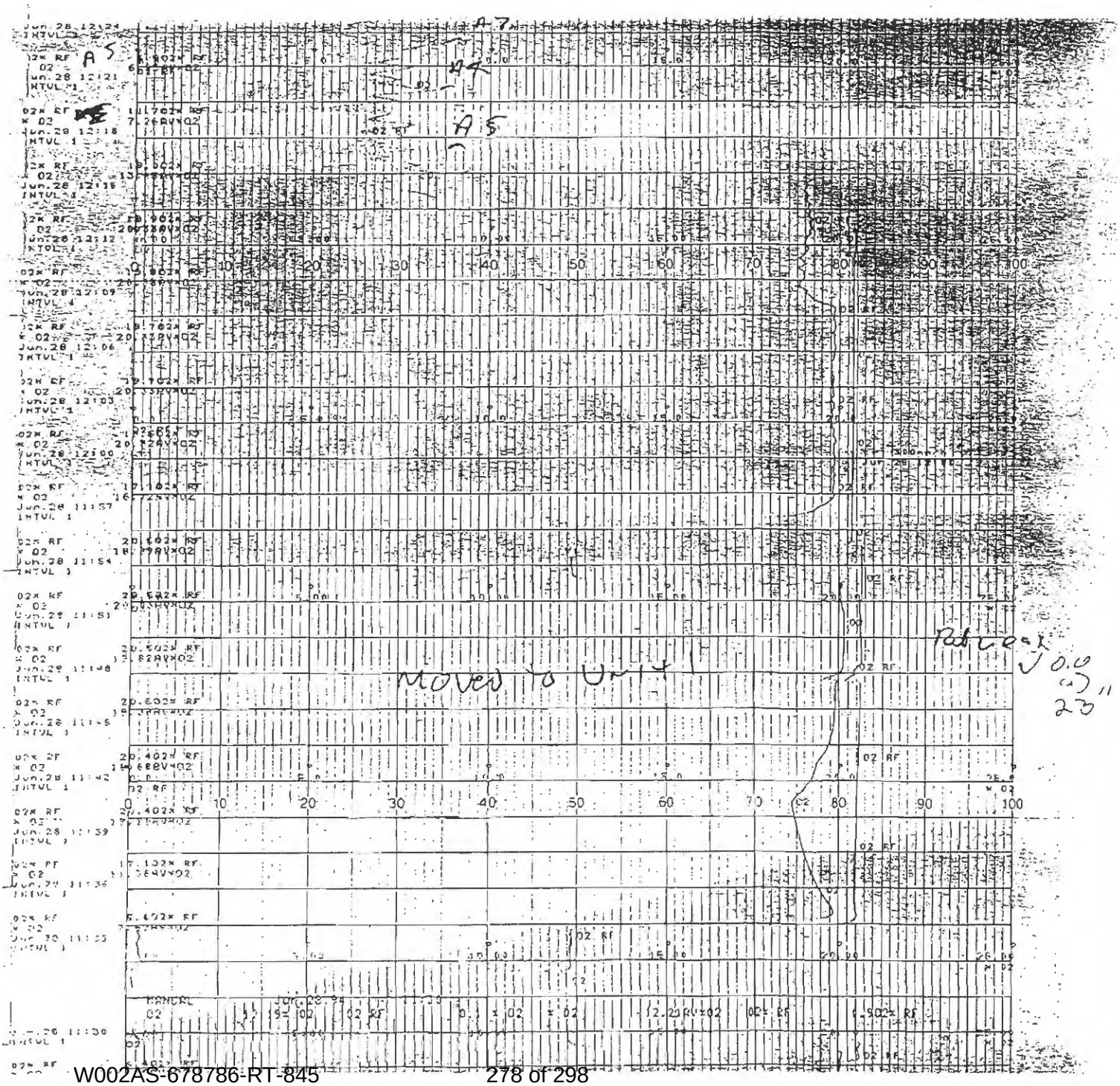

MANUAL
Jun.28.94
16:22
02
20.7%O2
15.0%RV=O2
02% RF
20.1%O2% RF
10
20
30
40
50
60
70
80
90
100
F-1
F-2
F-3
F-4
F-5
E-1
E-2
E-3
E-4
E-5

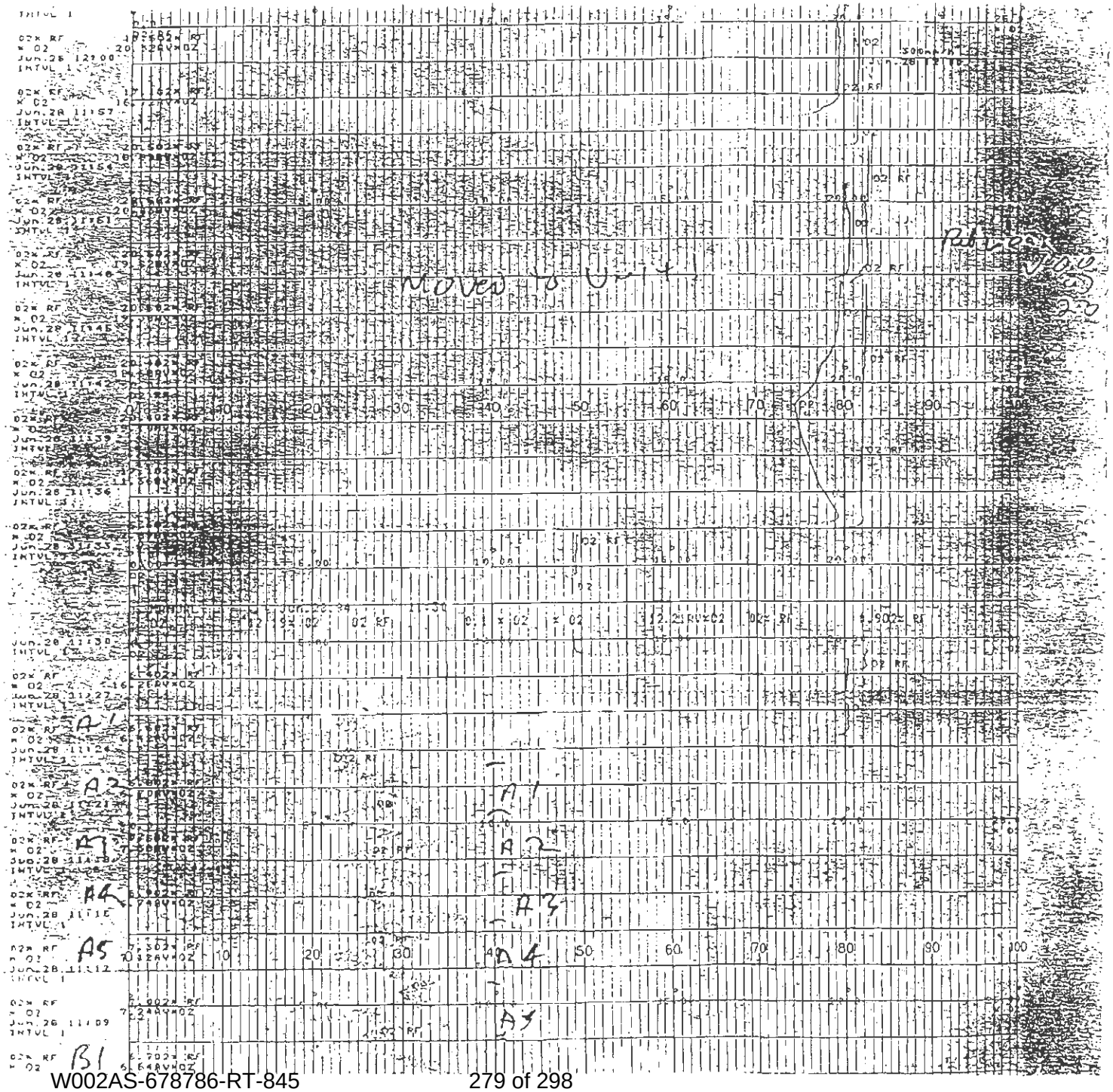

F-2
F-3
F-4
F-5
E-2
E-3
E-4
E-5
D2
D4
D5
C1
10
20
30
40
50
60
70
80
90
100

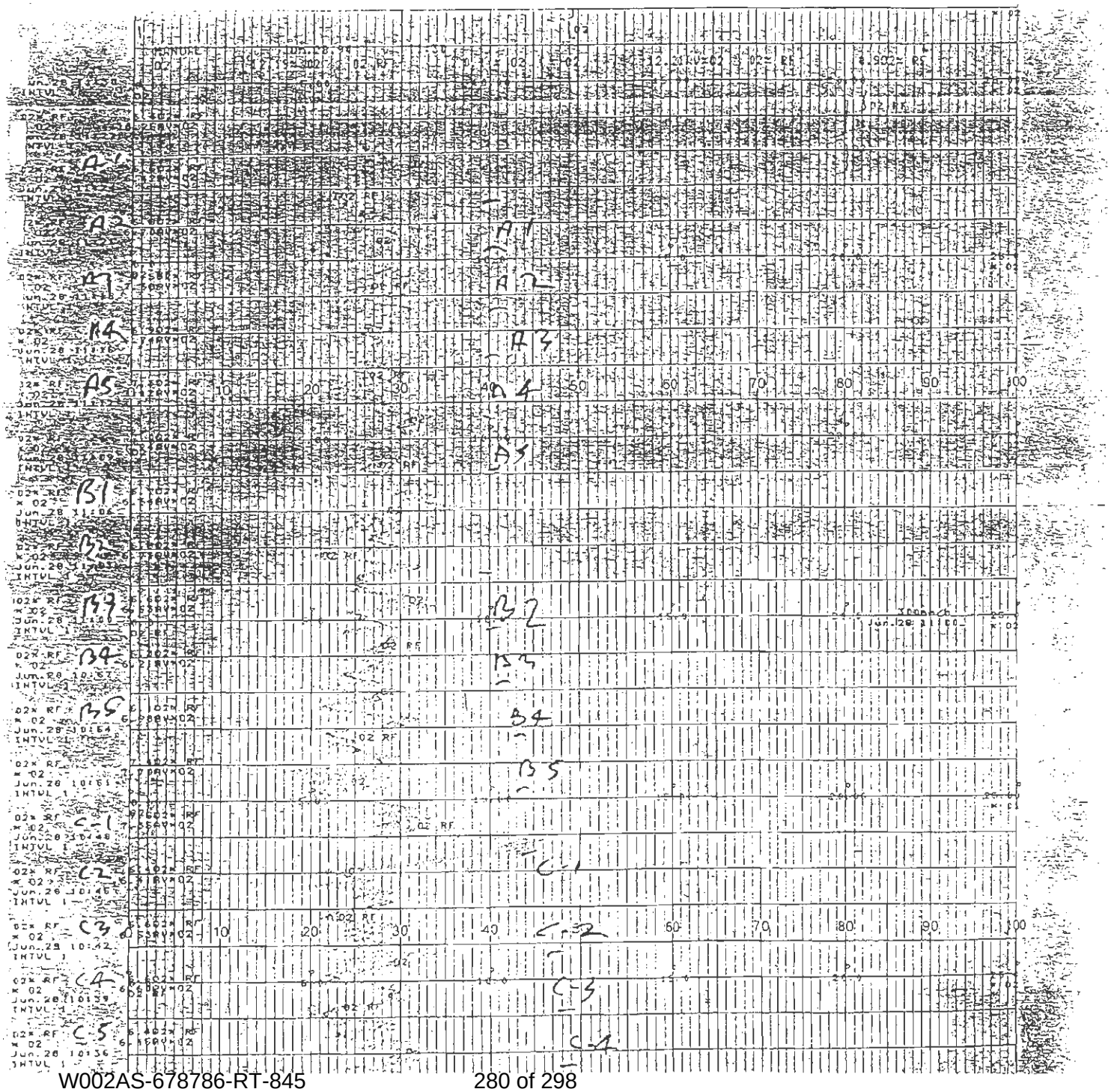

D2
D4
D5
C1
C2
C4
C5
B1
B2
B3
B4
B5
10
20
30
40
50
60
70
80
90
100

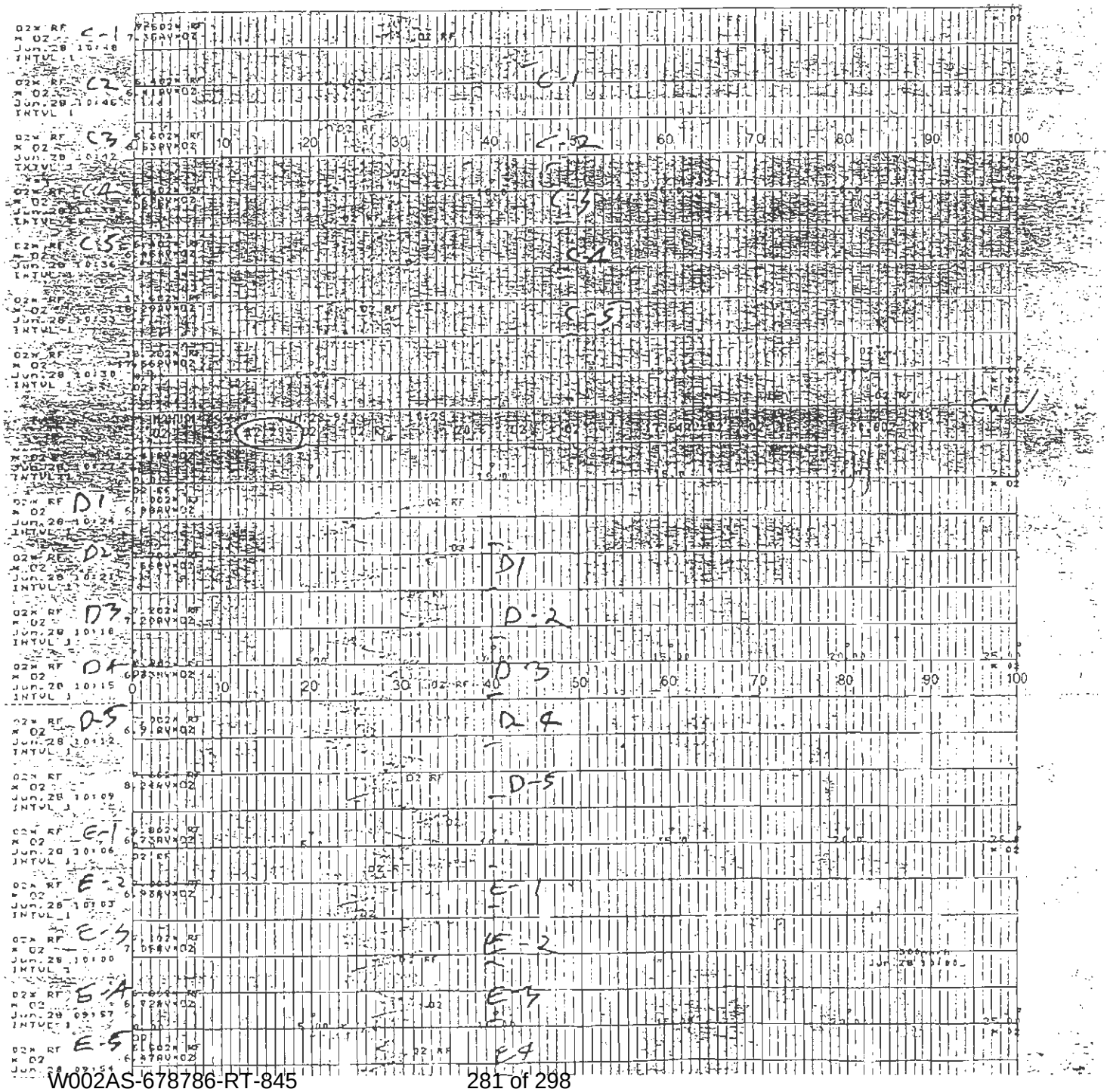

C2
C4
C5
C3
C1
C6
B1
B2
B3
B4
B5
B6
A1
A2
A3
A4
A5
10
20
30
40
50
60
70
80
90
100

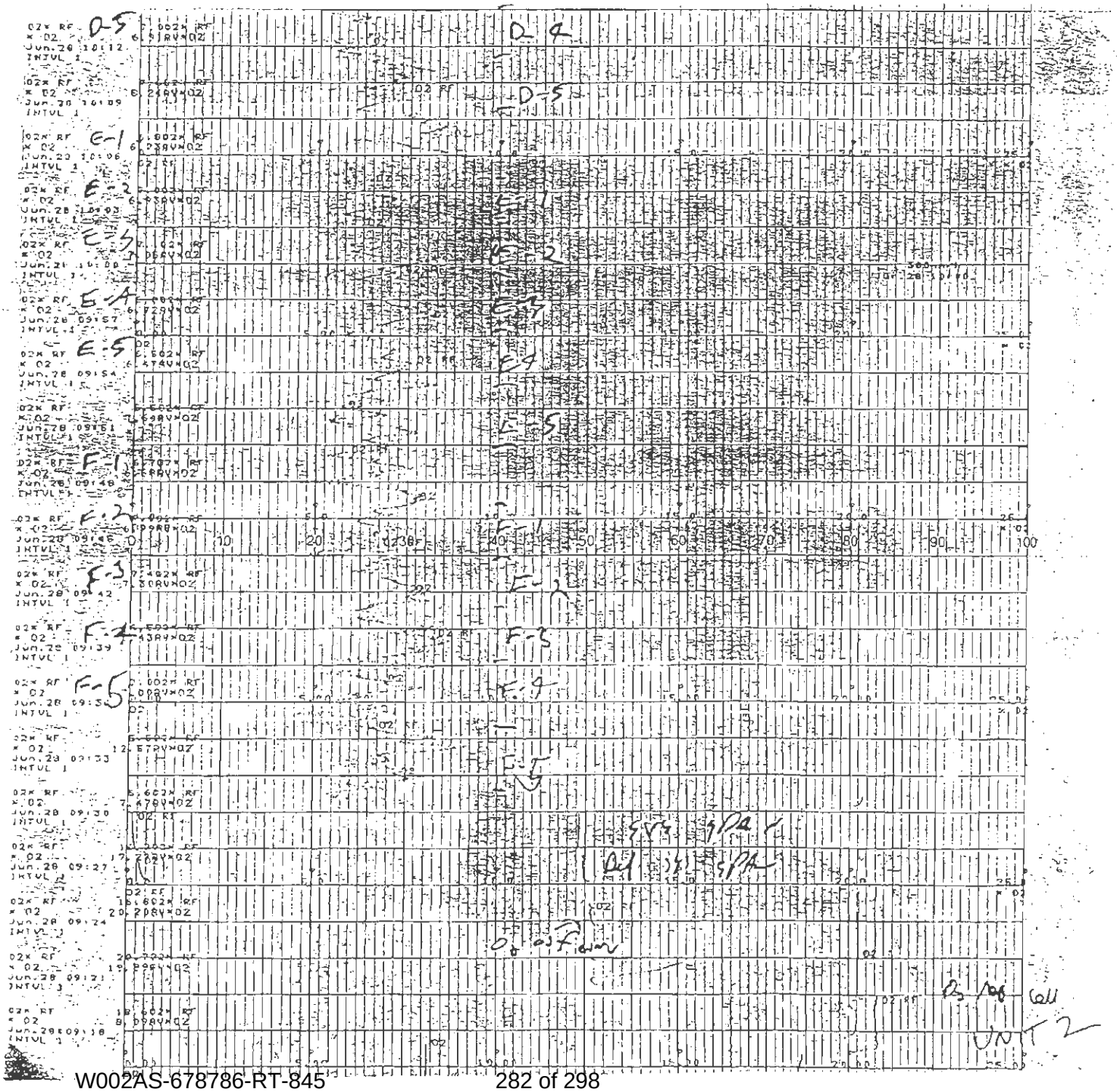

B4
B5
A2
A3
A5
MOVED TO UNIT 1


A5
A5
MOVED TO UNIT
0
10
20
30
40
50
60
70
80
90
100


Moves to Unit
Above Vent
A1
A2
A3
A4
A5
B1


A1
A2
A3
A4
A5
B1
B2
B3
B4
B5
C1
C2
C3
C4
C5
10
20
30
40
50
60
70
80
90
100


C-1
C-2
C-3
C-4
C-5
D1
D-2
D-3
D-4
D-5
E-1
E-2
E-3
E-4
E-5


D-5
E-1
E-2
E-3
E-4
E-5
F-1
F-2
F-3
F-4
F-5
10
20
30
40
50
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70
80
90
100

APPENDIX C
SITE SAFETY PLAN

MONTROSE ENVIRONMENTAL

Site Safety Plan Booklet

Finalized: April, 2018

Introduction

Employee safety is the top priority of Montrose Environmental Group. All employees must be trained to mitigate the hazards faced each day. The site manager and project manager/lead are responsible to ensure all hazards have been proper identified and managed. All employees have Stop Work Authority in all situations where an employee feels they cannot perform a job safely or a task for which they have not been adequately trained.

The Site Safety Plan (SSP) has been developed to help assist Montrose test crews with identifying physical and health hazards that could harm our employees and determining how the hazards will be managed. Additionally, the SSP will help each crew manage the health of the employees by providing emergency procedures and information.

The booklet contains all the different safety forms that you may need in the field into one document. The SSP consists of the following:

1. A standardized, two-page, fillable pdf, form that is used as the Hazard Analysis and Safety Plan
2. Hazard Control Matrix - contains useful information on both engineering and administrative controls that a crew can use to reduce or eliminate the hazards they have observed plus applicable PPE that may be required
3. Tool Box Meeting Record – Keeps a daily record of the scheduled testing for the day and a short refresher of the hazards that were identified in the test location SSP and any hazard controls/PPE
4. Additional Forms
    a. Aerial Lift Inspection Form
    b. Heat Stress Prevention Form
    c. Extended Hours Form
    d. Safe Work Permit

An SSP for each location must be completed or at least started prior to mobilization and included as part of your Project Test Plan. Each test crew will then assess the hazards again while on-site looking for changes or new hazards. Once an SSP is completed, it will need to be reviewed before set up at each of your client's testing locations. Any day a SSP is not reviewed, a Tool Box Meeting will need to be completed.

The SSP is a living document. Each test crew should update the plan as new hazards are found. The client project manager should continually update their SSPs as new information and conditions result in new or changed hazards. The goal is to provide each crew with the most up-to-date hazard and safety information

MAQS Site Safety Plan

Client	Desert View Power	Contact Name	Kevin Lawrence	Date	01/15/20
Location	Mecca, CA	SSP Writer	Dave Wonderly	PM	

Job Preparation

☐ Job Site Walk Through Completed ☐ Site Specific Training Complete ☐ Certified First Aid Person
☐ Site Walk Through Needed ☐ Site Specific Training Needed ☐ Other:

Facility Information/Emergency Preparedness

Plant Emergency # (760) 396-2554
On-Site EMS ☐ Yes ☒ No
EMS Location
Nearest Urgent Care Facility:

Identify and Locate the following:
Evacuation Routes to main gate
Severe Weather Shelter Source test trailer
Rally Point Main Gate
Location of Eye Wash/Safety Shower:

Source Information: (list type)

Flue Gas Temp. (°F) 350 Flue Gas Press. ("H_2O) 0.1 Flue Gas Components NOx, SO2, HCL, NH3

Flue Gas Inhalation Potential? ☒ Yes ☐ No

Describe Hazard Protection Plan: Keep ports closed and or covered, use a acid gas resperator as needed.

Required PPE ☒ Hard Hats ☒ Safety Glasses ☒ Steel Toed Boots ☒ Hearing Protection

Additional PPE Requirements

☐ Hi-Vis Vests ☐ Harness/Lanyard* ☐ Goggles ☐ Personal Monitor Type:
☐ Metatarsal Guards ☐ SRL(s) ☐ Face Shield ☐ Respirator Type: acid gases
☐ Nomex/FRC ☐ Hot Gloves ☐ 4-Gas Monitor ☐ Other PPE:

Critical Procedures – check all that apply – "*" indicates additional form must be completed

☐ Hot Weather Work* ☐ Confined Space* ☐ Aerial Work Platform* ☐ Roof Work ☐ Scaffold
☐ Cold Weather Work ☐ Lock out/Tag Out ☐ Exposure Monitoring ☐ Other:

Working at Heights Management

Fall Protection Plan ☒ Fixed Guardrails/Toeboards ☐ Fall Protection PPE ☐ Warning Line

Describe Hazard Protection Plan: Large well protected platform 20" above grade.

Falling Objects Protection Plan

☐ Barricading ☐ Netting ☒ House Keeping ☐ Tethered Tools ☐ Catch Blanket or Tarp ☐ Safety Spotter

Describe Hazard Protection Plan:

MAQS Site Safety Plan

Fall Hazard Communication Plan

☐ Adjacent/Overhead Work ☐ Contractor Contact ☐ Client Contact

Describe Communication Plan:

Environmental Hazards - Weather Forecast

☐ Heat/Cold ☐ Lightning ☐ Rain ☐ Snow ☐ Ice ☐ Tornado ☐ Wind Speed _____

Describe Hazard Protection Plan:

Additional Work Place Hazards

Physical Hazards	Hazard Controls
☐ Nuisance Dust Hazards	☐ Dust Mask ☐ Goggles ☐ Other:
☐ Thermal Burn	☐ Hot Gloves ☐ Heat Shields ☐ Other Protective Clothing:
☐ Electrical Hazards	☐ Connections Protected from Elements ☐ External GFCI ☐ Other:
☐ Inadequate Lighting	☐ Install Temporary Lighting ☐ Headlamps
☐ Slip and Trip	☐ Housekeeping ☐ Barricade Area ☐ Other:

Describe Hazard Protection Plan:

List of Hazardous Chemicals

				Other Chemicals:
☑ Acetone	☐ Nitric Acid	☑ Hydrogen Peroxide	Compressed Gases	☐
☐ Hexane	☐ Sulfuric Acid	☑ Isopropyl Alcohol	☐ Flammable Gas	☐
☐ Toluene	☐ Hydrochloric Acid	☐ Liquid Nitrogen	☑ Non-Flammable Gas	☐

Describe Hazard Protection Plan: Use of glovers when handling liquid reagents.

Wildlife/Fauna

Describe Hazard Protection Plan:

Crew Names & Signatures

Print Name	Signature	Date	Print Name	Signature	Date

Job Site Hazard Mitigation Plan

Hazard	Description	Engineering Controls	Administrative Controls	PPE
Ergonomic: Strains/Sprains	The manual movement of equipment to testing location can cause strains	• Eliminate manual “lifts” and use elevators and/or cranes when possible. Stairs can also be used where feasible. • Use lifting straps and locking carabiners to eliminate the need to continuously tie and untie loads. • Use pulley system to eliminate improper ergonomics when lifting and facilitate sharing of loads • Winches should be evaluated and used as much as possible to assist • Equipment should be staged on table or other elevated platform to assist with rigging, lifting and prevent bending over when securing equipment to hoist. • Maintain radio contact between ground and platform to ensure the process is going smoothly or if a break is needed.	• Stretching prior to and after lifting and lowering tasks to keep muscles and joints loose • Break loads into smaller more manageable portions • 3 man lift teams during initial set up and tear down w/2 below and one above • Job rotation and/or breaks during initial set up and tear down. • Discuss potential hazard and controls during tailboard meetings • Observe others and comment on technique	• Gloves, appropriate to task
Falling objects	When working from heights there is a potential of falling objects from elevated work platform striking someone or something below	• Ensure job area is barricaded off with hazard cones, caution tape and/or appropriate warning signs. Specific measures should comply with local plant rules. • Ensure a spotter is present during a lift or lowering of equipment. • Catch blanket should be used on the platform to prevent objects from falling through any grating. • Magnetic trays should be used to hold flange bots and nuts. • Tools should be tethered to platform or personnel uniform.	• Review hazards with any adjacent workers & the client so they understand the scope and timing of the job • Follow proper housekeeping practices by keeping the test location neat and orderly, keeping trash in bags and non-essential equipment stored when not in use. • Perform periodic job site inspections to ensure housekeeping is being observed • Review “grab and twist” method of handling tools and equipment between employees	• Hardhat • Steel toed boots • Work clothes

Job Site Hazard Mitigation Plan

Hazard	Description	Engineering Controls	Administrative Controls	PPE
Fall	Fall hazard exists when working from above 4' with no guardrails	• Verify anchor point • Warning Line system	• Review Working from Heights procedure prior to job • Maintain 3 points of contact when climbing stairs or ladders • Ensure all fall protection equipment has been inspected and is in good working order	• Harness and Lanyard
Burn	Flue gas temperature can be elevated and that can lead to hot temperature testing equipment. Hot pipes or other duct work at plant.	• Use heat resistant refractory blanket insulation to seal port once probe is inserted. Use duct tape to further seal the outer flange area of the port. • Use heat resistant blankets to shield workers from hot sources	• Work in tandem with partner to immediately fill sample port with heat resistant refractory insulation • Stand up wind of port when opening. If stack pressure is greater than 2" H_2O, a face shield is required. • Allow appropriate time to handle probes • Notify all team members at the test location when a probe is removed from a hot source and communicate to all crew members to exercise caution handling or working near the probe	• High temp. gloves • Long gauntlets • Long sleeve shirts • FRC
Atmosphere	Air concentrations could be above PEL	• Probe are to be sealed to prevent stack gases from leaking out • Ventilation, open all doors and window to dilute concentrations in work area • Vent analyzer or meter outside	• Stand up wind of ports • Use a gas monitor to ensure levels of contaminants are below PEL	• Respirator • SAR
Hearing	Production areas of plants could be high	NA	• Set up equipment or trailer as far away as possible from noise producing plant equipment.	• Ear plugs • Ear muffs (check with plant contact on exposure levels)

Job Site Hazard Mitigation Plan

Hazard	Description	Engineering Controls	Administrative Controls	PPE
Fire	High flue gas temps, chemicals, electricity could cause fire	• Fire extinguisher at job location	• Observe proper housekeeping • If conducting hot work, review procedures and permitting with site contact	• N/A
Weather	Conditions may pose significant hazards	• Weather App warning	• Lightning policy • JHA review of weather daily • Plant severe weather warning systems	• Appropriate clothing for conditions
Hot Weather	Extreme hot temperatures can cause physical symptoms	• Shade • Reduce radiant heat from hot sources • Ventilation fans	• Frequent breaks • Additional water or electrolyte replenishment • Heat Stress Prevention Form • Communication with workers • Share work load	• Appropriate clothing for conditions • Sunscreen
Cold Weather	Extreme cold temperatures can cause physical symptoms	• Hand warmers • Heaters • Wind blocks	• Calculate wind chill • Frequent warm up periods • Communication with workers	• Appropriate clothing for conditions
AWP	Overhead and ground hazards pose dangers	• Ensure all fall protection equipment has been inspected and is in good working order • Barricade off area where AWP is in use	• AWP pre-use inspection can identify problems with equipment • Site walk through can identify overhead and ground hazards	• Hardhat • Steel toed boots • Safety glasses • Harness/lanyard • Gloves
Scaffold	Fall hazard	• Yellow tagged scaffold may require harness & lanyard • Inspect harness & lanyard prior to use • Barricades • Netting	• Scaffold inspection prior to use can identify if scaffold meets OSHA regulations • Current scaffold training	• Hardhat • Steel toed boots • Safety glasses • Harness/lanyard

Job Site Hazard Mitigation Plan

Hazard	Description	Engineering Controls	Administrative Controls	PPE
Chemicals	Chemical fumes or splashing can cause asphyxiation or burns	• Chemical containers stored properly • Ventilation • Properly labeled secondary containers	• Spill kit training • Lab SOP • Good housekeeping • Personal hygiene	• Safety glasses • Chemical gloves • Lab coat • Ventilation • Goggles/Face shield as needed

Daily Tool Box Meeting Record

Client: _____ **Job No.:** _____ **Location:** _____ **Date:** _____

Scope of Work: _____

_____

_____

Changes in Hazards Any significant change in Hazards, update Site Specific Plan and sign off.

Site Specific Plan review

☐ ***Emergency Preparation*** ____ Rally Point ____ Alternate Exits ____ Obstacles in Route

☐ ***Source*** ____ Stack Temp. ____ Static Pressure ____ Flue gas contaminants

☐ ***PPE***

____ Hard Hats	____ Safety Glasses	____ Steel Toed Boots	____ Hearing Protection
____ Hi-Vis Vests	____ Harness*	____ Goggles	____ Personal Monitor Type: _____
____ Metatarsals	____ SRL	____ Face Shield	____ Respirator Type: _____
____ Nomex/FRC	____ Hot Gloves	____ 4-Gas Monitor	____ Other PPE: _____

☐ ***Critical Procedures***

____ Scaffold	____ Aerial Work Platform*	____ Confined Space*
____ LOTO	____ Roof Work	____ Exposure Monitoring

☐ ***Fall Protection*** ____ Guardrails ____ Fall Protection ____ Warning Lines

☐ ***Working at Heights***

____ Barricading	____ Tethered Tools	____ Netting
____ Housekeeping	____ Catch Blanket	____ Other: _____

☐ ***Barricades***

____ Morning Inspection _____
Printed Name Signature

____ EOBD Inspection _____
Printed Name Signature

☐ ***Communication*** ____ Adjacent/Overhead Work ____ Contractor Contact ____ Client Contact

☐ ***Weather***

____ Forecast	____ Lightning	____ Wind Speed	____ Wind Direction
____ Temperature	____ Cold	____ Hot*, *above 91° F use Heat Stress Prevention Form*	
____ Fluids Reminder	____ Proper Clothing	____ Ice-Rain	____ Snowy

☐ ***Workplace Hazards*** ____ Dust ____ Electrical ____ Slips, Trips & Falls ____ Thermal Burn ____ Lighting

☐ ***Chemical***

____ Labeling	____ PPE	____ Cylinders Secured
____ Storage	____ Ventilation	____ Sample Storage

☐ ***Surroundings***

____ Site Traffic	____ Trucks	____ Forklifts
____ Construction	____ Cranes	____ Wildlife/Fauna
____ Machine Guarding	____ Chemical	____ Upwind/downwind Hazards

☐ ***Harness & Lanyard***

Inspected by:

_____
Printed Name Signature

_____
Printed Name Signature

_____
Printed Name Signature

_____
Tool Box Meeting Leader Signature

Test Crew Initials:

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Notes:

*Required for Boat Tour

Montrose Air Quality Services -Daily Aerial Lift Inspection Form

All checks must be completed before operation of the aerial lift. This checklist must be used at the beginning of each shift or after six to eight hours of use.

General Information (Check All That Apply)

Manually Propelled Lift: _____ **Self-Propelled Lift:** _____

Aerial Lift Model Number: _____ **Serial Number:** _____

Make: _____ **Rented Or Owned?** _____

Initial Description – Indicate by checking "Yes" that an item is adequate, operational, and safe. Check "No" to indicate that a repair or other corrective action is required prior to use. Check "N/A" to indicate "Not Applicable."

Number Item to be Inspected	Yes	No	N/A
A. Perform a visual inspection of all aerial lift components, i.e. missing parts, torn or loose hoses, hydraulic fluid leaks, etc. Replace as necessary	☐	☐	☐
B. Check the hydraulic fluid level with the platform fully lowered	☐	☐	☐
C. Check the tires for damage. Check wheel lug nuts for tightness	☐	☐	☐
D. Check the hoses and the cables for worn areas or or chafing.	☐	☐	☐
E. Check for cracked welds	☐	☐	☐
F. Check the platform rails and safety gate for damage	☐	☐	☐
G. Check for bent or broken structural members	☐	☐	☐
H. Check the pivot pins for security	☐	☐	☐
I. Check that all warning and instructional labels are legible and secure	☐	☐	☐
J. Inspect the platform control. Ensure the load capacity is clearly marked	☐	☐	☐

Initial Description – Continued

Number Item to be Inspected	Yes	No	N/A
K. Check for slippery conditions on the platform	☐	☐	☐
L. Verify that the Manufacturer's Instruction Manual is present inside the bucket	☐	☐	☐
M. Check the hydraulic system pressure (See manufacturer's specifications). If the pressure is low, determine the reason and repair in accordance with accepted procedures as outlined in the service manual	☐	☐	☐
N. Check the base controls for proper operation. Check switches and push buttons for proper operation	☐	☐	☐
O. Check the platform controls for proper operation. Check all switches and push buttons, as well as ensuring that the drive controller returns to neutral	☐	☐	☐
P. Verify that a fire extinguisher is present, mounted, and fully charged and operational inside the bucket	☐	☐	☐
Q. Verify that the aerial lift has headlights and a safety strobe-light installed and fully operational	☐	☐	☐
R. Verify that the aerial lift has a fully functional back-up alarm	☐	☐	☐

Print Name of Individual Inspecting Location Date
Aerial Location Date Lift

Heat Stress Prevention Form

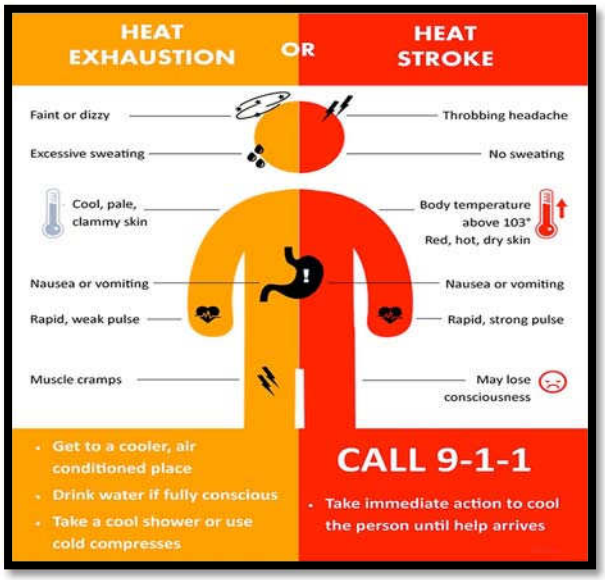
This form is to be used when the Expected Heat Index is above 91 degrees F. Keep the form with project documentation.

Project Location:_____

Date:_____Project Manager:_____

Expected High Temp:_____Expected High Heat Index:_____

1. Review the signs of Heat Exhaustion and Heat Stroke
2. If Heat Index is above 91 degrees F:
    a. Provide cold water and/or sports drinks to all field staff. Avoid caffeinated drinks and energy drinks which actually increase core temperature. Bring no less than one gallon of water per employee.
    b. If employee are dehydrated, on blood pressure medication or not acclimated, ensure they are aware of heightened risk for heat illness.
    c. Provide cool head bands, vests, etc.
    d. Have ice available to employees.
    e. Encourage work rotation and breaks, particularly for employees working in direct sunlight.
    f. Provide as much shade at the jobsite as possible, including tarps, tents or other acceptable temporary structures.
    g. PM should interview each field staff periodically to look for signs of heat illness.
3. If Heat Index is above 103 degrees F:
    a. Employees must stop for drinks and breaks every hour (about 4 cups/hour).
    b. Employees are not permitted to work alone for more than one hour at a time without a break with shade and drinks.
    c. Employees should wear cool bands and vests if working outside more than one hour at a time.
    d. PM should interview each field staff every 2 hours to look for signs of heat illness.



Montrose Air Quality Services
Extended Hours Safety Audit

Project Number:_____ Date:_____ Time:_____

Whenever a project is going to extend past a 14-hourwork day, an Extended Hours Safety Audit to access the condition of their crew and the safety of their work environment must be completed. If a senior tech or a FPM is leading a project, they should confer with the CPM but they will need to get permission to proceed from the DM or RVP. CPMs need to get permission to proceed from the DM or RVP. Technical RVPs can authorize moving forward if they are in the field or if they own the project. DMs and RVPs may make the call in the field.

☐ Hold test crew meeting. Test Crew Initials:

"Extended or unusual work shifts may be more stressful physically, mentally and emotionally. Non-traditional shifts and extended work hours may disrupt the body's regular schedule, leading to increased risk of operator error, injuries and/or accidents."

The test leader should look for signs of the following in their crews:

- Irritability
- Lack of motivation
- Headaches
- Giddiness
- Fatigue
- Depression
- Reduced alertness, lack of concentration and memory

The test leader should assess the environmental and hazardous concerns:

- Temperature and weather
- Lighting
- Climbing
- Hoisting
- PPE (respirators, ect.)
- Pollutant concentration in ambient air (SO_2, H_2S, ect.)

☐ Notify DM or RVP Name:

The test leader must contact either the DM or RVP to discuss the safety issues that may arise due to the extended work period. During this time, they can come to an agreement on how to proceed.

Things to discuss are why the long hours?
Client or our delays?
Production limitations?
Impending Weather?

☐ Contact client

The test leader, DM or RVP should discuss with client any of our safety concerns, the client's needs and come to agreement on how to proceed. Discussion should also include the appropriate rest period needed before the next day's work can begin. The DM and/or a RVP must be kept in the loop on what the final decision is.

What was the outcome?

SAFE WORK PERMIT

A. WORK SCOPE (to be completed by MEG) – Check relevant box(es) to indicate type(s) of work.						
□ Hot Work	□ Line Break	□ Lock-out Tag-out	□ Other		**Permit Timing**	
Specific Location:					Date:	Time:
Equipment Worked On:					Valid Until	
Work to be Performed:					Date:	Time:

B. POTENTIAL HAZARDS (To be completed by MEG)			
□ Flammable	□ Harmful to breathe	□ Harmful by Skin Contact	
□ Verify process hazards have been reviewed			
C. PERSONAL PROTECTIVE EQUIPMENT (Check all additional equipment that is required)			
○ Tyvek Suit	○ Hearing Protection	○ H2S Monitor	○ Flash Hood
○ Rain Gear	○ Goggles	○ Safety Harness & Life Line	○ Life Vest
○ Chemical Resistant Gloves	○ Face shield	○ Tripod ER Escape Unit	○ Supplied Air Respirator
○ Rubber Boots	○ Organic Vapor Respirator	○ Fall Protection Equipment	○ Dust Respirator
○ Other:			
D. CHECK LIST (Check what has been completed)			
○ Joint Job Site Visit	○ Electrical Isolation Completed	○ Line Identified	○ Equipment Water Flushed
○ Equipment Depressurized	○ Isolated and locked out	○ Equipment Identified	○ Equipment Inert Gas Purged
○ Vents Opened & Cleared	○ Blinds in Place	○ Electrical Equipment Still Live	○ Written JSA Completed
○ Atmosphere Tested	○ Electrical Equipment Still Live	○ Equipment Still Live	○
Other:			
E. PRECAUTIONS (Check what must be completed PRIOR to commencing work)			
○ Cover Sewers	○ Scaffolding Inspection Done	○ Charged Hose/Area Wet	○ Communication Device(s)
○ Air Mover (Grounded)	○ Fire Extinguisher	○ Covered Cable Trays	○ Fire Watch
○ Barricade/Signs	○ Fire Resistant Blanket	○ Continuous Air Monitoring	
○ Other:			
○ Designated Fire Watch Individual and Start time (30 min after hot work):			
○ Fire Watch Complete (signature and time):			

F. HAZARD ANALYSIS (add additional information to form as necessary)			
	Job Steps	Potential Hazards	Hazard Controls
1.			
2.			
3.			
4.			

I VERIFY THAT THE ABOVE CHECK LIST "D" HAS BEEN COMPLETED, ALL OTHER CONDITIONS ("B", "C", "E", "F") ARE UNDERSTOOD AND WHEN MET, THE AREA IS SAFE FOR WORK TO COMMENCE.			
Name:	Signature:	Date:	Time:

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If you have any questions, please contact one of the following individuals by email or phone.

Name: Mr. David Wonderly
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Name: Mr. Matt McCune
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