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Project No. 1079 A

SOURCE EVALUATION REPORT

WILLAMETTE INDUSTRIES, INC

Dry Kiln Particulate and VOC Emissions while Drying Douglas Fir

16 Ft. Wellons Dry Kiln at Oregon State University
Corvallis, Oregon

December 14-19, 1998

Prepared for

Vaughn Laminating Complex
Warrenton Saw Mill
Willamette Industries, Inc.
Western Administrative & Sales Office
P.O. Box 907
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by
David R. Rossman, P.E.

Expires 12/31/00

CERTIFICATION

I certify that to the best of my knowledge the enclosed information is authentic and accurate and that the procedures were conducted according to the EPA Methods referenced in the report.

David Rossman 2/4/99

David R. Rossman, P.E. Date
Horizon Engineering

David Broderick Date
Team Leader

Introduction

Source tests were made December 14-19, 1998 on the exhaust of the 16-foot Wellons dry kiln at the Oregon State University Forest Research Lab in Corvallis, Oregon. Particulate and volatile organic compounds (VOC) as total gaseous organic compounds (TGOC) were monitored throughout two complete drying cycles of Douglas Fir. The testing was done to verify emission factors in the Title V operating permit for the Willamette Industries Warrenton saw mill and Vaughn Laminating Complex.

David Broderick, Joe Fiedler and David Bagwell of Horizon Engineering did the testing. Jon Lund of Willamette Industries arranged for the testing; Dr. Michael Milota and Mark Lavery of OSU operated the Kiln. A source test plan was filed with Jack Herbert of the Oregon Department of Environmental Quality (ODEQ) and Gracia Castro of Lane Regional Air Pollution Authority. Tom Freeman of LRAPA visited the site during the testing.

Summary of Results

The test results are summarized in Table 1. Although the testing periods covered about 93% of the actual drying cycles, the results have been extrapolated to the entire drying cycle times and have been calculated on a production basis. Detailed results and sampling parameters are included in the Appendix.

Particulate numbers include the "back half" condensable material collected in the impingers and on a filter following the impingers (as specified in ODEQ Method 7). The condensable fraction of material averaged about 70% for the two test cycles. Particulate emissions using EPA Method 5 would not include this material.

VOC results were obtained using the continuous flame ionization detector method of EPA Method 25A. The sample was diluted with dry air to avoid attenuation from the high moisture gas stream.

Table 1

Douglas Fir Test Results, Wellons Dry Kiln, OSU

Test Dates: December 14-19, 1998

	Units	Cycle 1	Cycle 2	Average
Particulate (ODEQ M-7)	lb/mbf	0.020	0.024	0.022
	lb/hr	0.0008	0.0010	0.0009
	gr/dscf	0.0016	0.0017	0.0017
Volatile Organic Compounds				
TGOC, dry basis (EPA M-25A)	lbC/mbf	0.40	0.38	0.39
	lbC/hr	0.017	0.016	0.017
	ppmC	150	123	137
Source Parameters				
Flow Rate, standard	dscf/min	60	69	65
Flow Rate, actual	acf/min	86	97	92
Exhaust Moisture	%	23	21	22
Exhaust Temperature	°F	146	145	146

Description of the Source and Its Operation

The 16-foot Wellons kiln located in the Forest Research Lab at OSU is a small version of a production kiln and is set up to dry about 2000 board feet at a time. A computer in an adjoining lab room controls the drying cycle. Photographs at the end of the report text show the kiln and sampling setup.

The kiln is steam-heated with coils located above the lumber on either side of an axial fan. The fan reversed every three hours (all programmed on the computer) to keep the drying process more uniform.

There are two exhaust vents with motorized dampers, one from each side of the

steam coils. As the fan blows in one direction, the positive-pressure side (between the steam coils and the lumber stack) exhausts through one vent while the negative-pressure side vent is drawing in ambient air. The dampers are controlled to keep the wet bulb temperature at the programmed level, so it is expected that exhaust flow rates will vary over the cycle.

The exhausts were sampled above the roof of the building through ports located to meet EPA Method 1 criteria. Two traverses were made on each exhaust for each test run. VOC was sampled through another port just upstream from the particulate sampling ports.

Although not directly related to this work, it is notable that the aluminum exhausts and screens over their exits showed no deposits of material. According to Dr. Milota, the kiln was installed in 1989 and has been in regular use (about 25% overall) since then and the aluminum of the exhausts is still bright material, inside and out.

Two loads of Douglas Fir were dried to less than 13% moisture, dry basis, over 60-hour cycles. The wood dried during testing was from the Willamette Industries Vaughn facility. The logs were 20 to 60 days old when cut on November 9, 1998. The lumber was shipped under cover on December 11 to OSU and stored outside under cover until the testing. The lumber was 16-foot sections of 2 x 6's. A total of about 2,560 board feet were dried in the first cycle and about 2,304 board feet in the second cycle.

The drying schedule is summarized in Table 2; Table 3 is the drying data summary. Graphs 1 and 2 show the dry and wet bulb temperatures inside the kiln.

Table 2

Drying Schedule

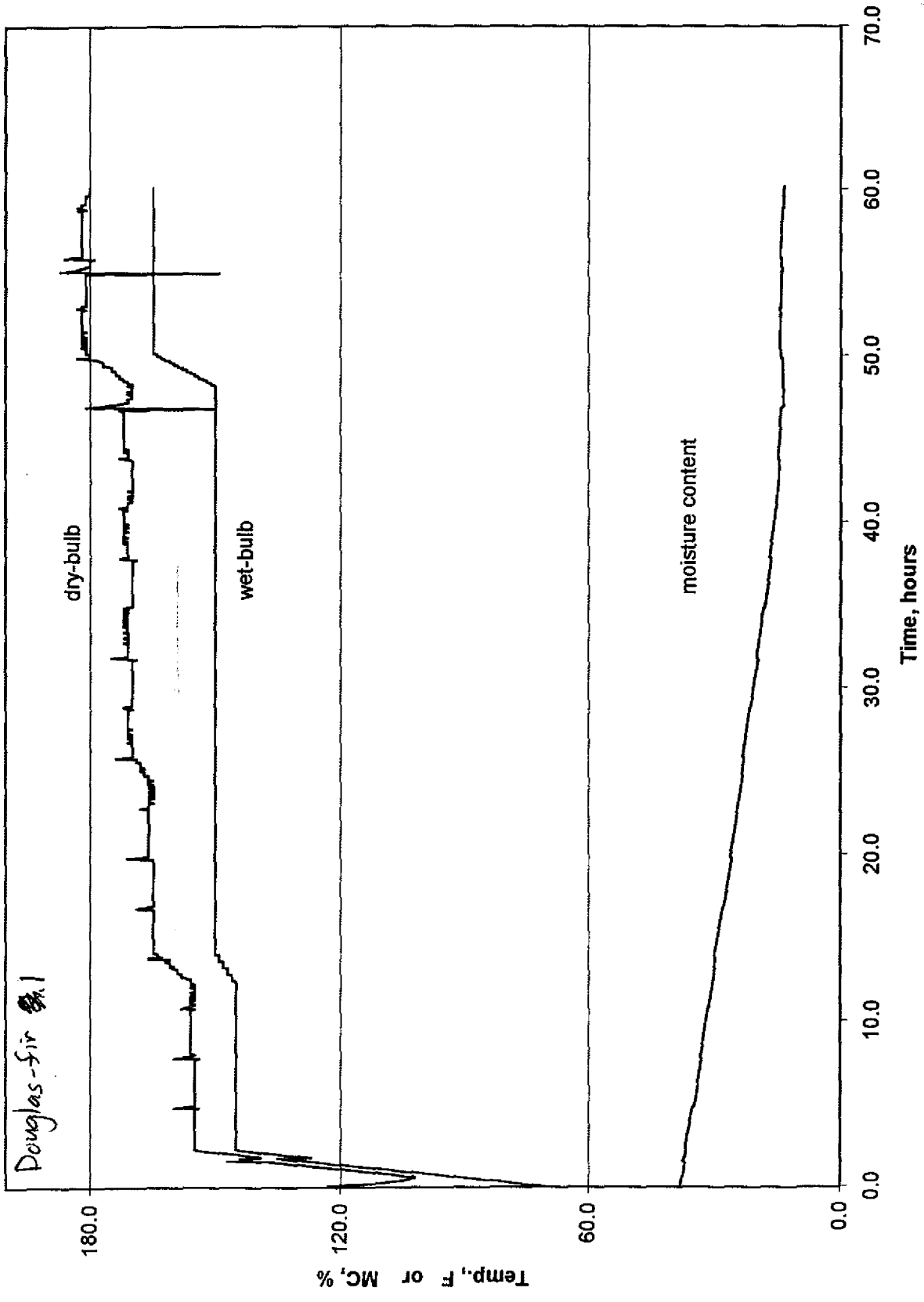
Period	Hour	Tdry	Twet	Time	Fan Reversals (hours)
Cycle 1					
1	0-2	80	70	2	1.5
2	2-12	155	145	10	3
3	12-24	165	150	12	3
4	24-48	170	150	24	3
5	48-60	180	165	12	3
Cycle 2					
1	0-2	80	70	2	1.5
2	2-12	155	145	10	3
3	12-24	165	150	12	3
4	24-36	170	140	12	3
5	36-52	170	140	16	3
6	52-60	180	165	8	3

Table 3

Drying Data Summary

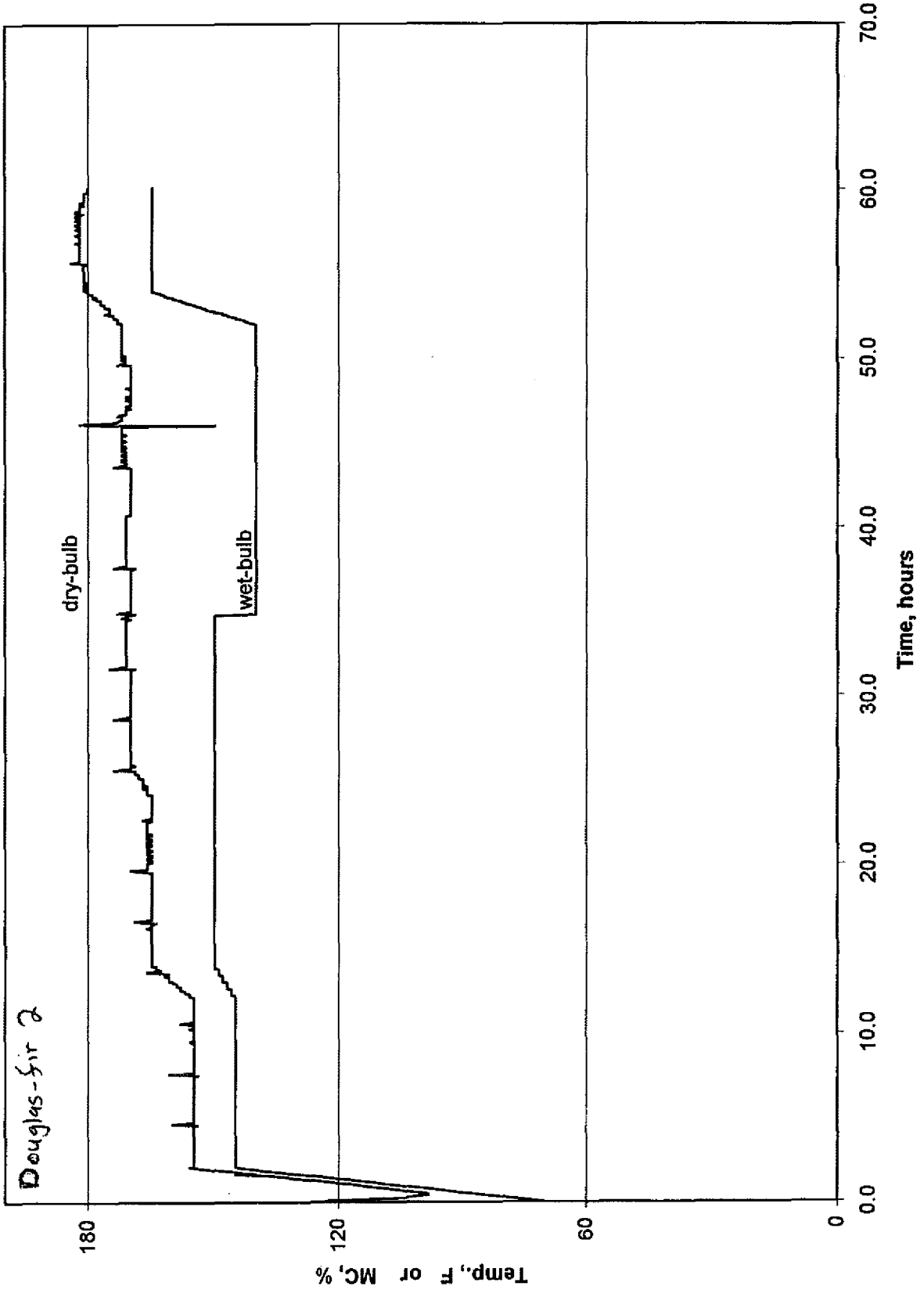
	Units	Charge 1	Charge 2
Run Time	Hours	60	60
Initial MC	% dry basis	38	38
Hot Check MC	% dry basis, hr:min	13.1@46:38 12@54:56	14.2@46:08
Final MC	% dry basis	12.8	11.9
Charge size	Board feet	2,560	2,304

Graph 1
OSU Cyc. 1 Fir



Graph 2

OSU Cyc. 2 Fir



Sampling and Analytical Procedures

General Two loads of lumber were dried; particulate and TGOCs were monitored almost continuously. The TGOC testing equipment was moved every three hours to the exhausting stack. For the particulate testing, one sampling train (set of filters and glassware) were used on each exhaust, keeping the same sample gear together for each individual stack over the entire cycle.

Problems During Run 7 of the first cycle the VOC probe was not moved to the exhausting stack for about two of the three hours. A time weighted average of the previous and following tests was used to fill in the time gap.

Total Particulate Oregon DEQ Method 7 equipment and operating methods were followed. DEQ Method 7 particulate includes the normal "front half" heated probe and filter material specified in EPA Method 5, as well as condensable material caught in the impingers in the "back half" of the train and a back half filter located between the last two impingers. Probe and front filter temperatures were maintained at 250°F during the sampling.

Supporting EPA Methods 1, 2 and 4 were followed for determination of traverse point locations, exhaust flow rates and moisture content. According to Method 2, the duct geometry required two perpendicular traverses of 6 points each for the particulate testing. Because of the extremely slow exhaust velocity, a Shortridge AirData 870 digital micro manometer was used to measure the velocity pressures instead of the normal inclined manometer. During much of the testing the velocity pressure differential was below 0.0010 inch of water. The micro manometer reads to 0.0000 inches of water.

Moisture was determined (through impinger weight gain) for each run (three-hour period) to allow moisture correction of the TGOC results. Blank correction calculations are in the Appendix. Blank water values apply only to the initial 200-ml of de-ionized water in the impingers at the beginning of the tests on each exhaust. Approximately 200 ml of condensed water was left in the first two impingers after each run.

Temperatures were monitored with k-type thermocouples and the indicators built into the Graseby Model 2010A pump/meter box. Calibrations on these and other equipment used are in the Appendix. Leak checks were made on the pitot lines and the sampling trains before and after each three-hour cycle. Isokinetic sampling conditions were determined with the aid of a Hewlett-Packard 48 series calculator programmed with the operating equations.

Lab analysis of the collected particulate samples was by Antech of Corbett, Oregon. Their results and worksheets are in the Appendix.

The lab has noted that the filter for Cycle 1 (east) had a shredded edge. This happens occasionally during sample recovery when the filter paper sticks to the filter holder. The glass fiber filter media is very fragile and breaks easily if stressed. In this event, the person recovering the sample is very aware that all of the filter (even tiny fragments) must be included in the sample. As much as possible is included in the petrie dish that contains the filter after its use. Any filter fragments not included with the filter (normally this is a layer sticking to glass front half of the filter holder), end up in the front acetone as that component is cleaned.

The result of this is that the net filter weight may be low or even negative, but the front acetone will be higher because it includes the filter fragments. The distribution of sample weight would appear different for that run, but unless part of the filter is actually lost, which is unlikely, there is no net effect on the calculated final sample weight for the run.

VOC A continuous analyzer was used for VOC determination as total gaseous organic compounds (TGOC) according to EPA Method 25A. A JUM Engineering Model VE-7 heated flame ionization detector was used on the 0-100 ppm range.

The gas sampling probe was moved at every fan reversal to stay in the exhausting stack. The sample stream was drawn through a heated stainless steel probe and heated glass fiber filter, passed through heated Teflon sample line to the heated FID analyzer in an equipment trailer. All sample-exposed lines and surfaces were stainless steel or Teflon. The sample was diluted at the

analyzer with charcoal filtered ambient air to keep the moisture going into the FID below 20%.

Calibrations on the TGOC analyzer were made using mixtures of propane in nitrogen. All calibration standards used in the testing are traceable to NIST standards. Introducing calibration gas just ahead of the heated filter made all calibration checks "bias" checks. Zero, span, and calibration error (linearity) were made at the beginning of each cycle. Before and after each three-hour test, bias checks were made first with no adjustments to the dilution air rotameter, then again with the dilution air shut off. The analyzer was very stable and rarely needed adjustments.

All of the analyzer checks were well within allowable limits. The calculated results are corrected for dilution air, moisture content (from the M-7 tests) and for minor instrument drift. Documentation for the quality assurance checks on the analyzer system and calibration gas certificates are in the Appendix.

The analyzer output was read every minute and recorded by a Rustrak Ranger II data logger. A strip chart record was also made as a backup. Data logger information and the accompanying software were used to determine the reported results. Graphic printouts of the data logger information are in the Appendix.

Calculations To calculate emissions for the entire drying cycle periods, data during calibration gaps and leak check periods had to be generated. Calibration periods were filled in with averages of the preceding and following tests. Any missing data periods due to equipment interruptions were also estimated using averages on both sides of the missing data. The process was very steady so this should have little or no effect on the results.

Discussion

All quality assurance checks, including leak checks and instrument calibrations, were within allowable tolerances. The isokinetics on a few of the runs were somewhat higher than normal Method 7 limits, but the fact that most of the particulate was in the back half makes isokinetics of little importance.

Particulate concentrations measured according to DEQ Method 7 and are accurate to ± 5% or less. Sample volumes were relatively large, sample weights were well above the interference level, and the long runs minimized the effect of reagent blank weights.

VOC concentrations measured according to EPA Method 25A and are accurate to ± 5% or less. Corrections were made for minor instrument drift.

The velocity measurements were made with a digital micro manometer because of the low velocity pressures. The uncertainty of the velocities and flow rates are estimated to be ±15%. There were some velocities measured at the micro manometer's lower limit of 0.0000 inches of water. The percent uncertainty in these values can become significant. That these numbers were small minimizes the uncertainty effect on the final results. The average velocity pressure for all of the test runs was about 0.0006 inches. Also, the accuracy of the S-type pitot coefficient at these low velocities is an unknown.

It is unlikely that all of the uncertainty will be in the same direction and overall we estimate that the VOC emission results are ± 20% or better. The VOC emission factor generated in this work is similar to the Douglas Fir emission factors published in NCASI Technical Bulletin 718.

Figure 1
Forest Research Lab with Kiln Exhausts (Looking East)

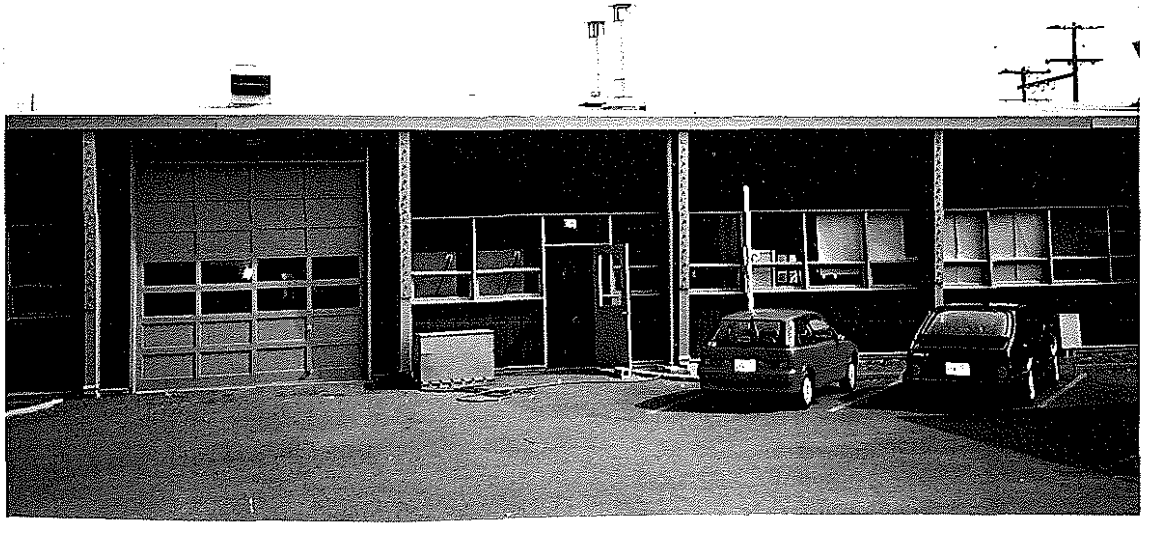


Figure 2
Kiln Exhausts During Sampling
(TGOC analyzer is in trailer)

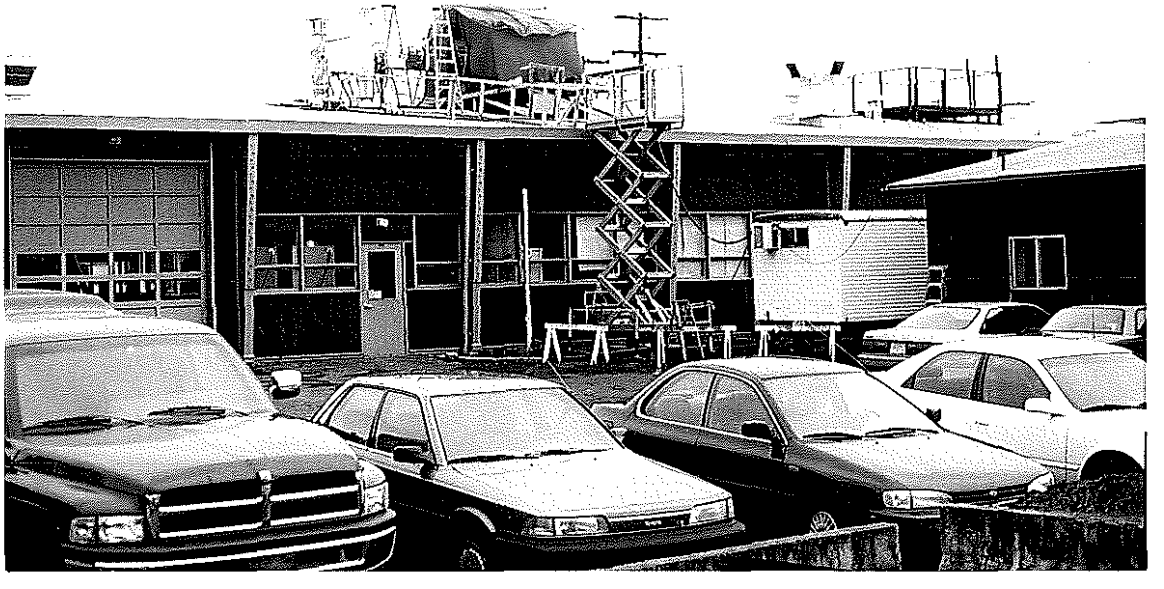


Figure 3

16 Ft. Wellons Kiln (Loading End)

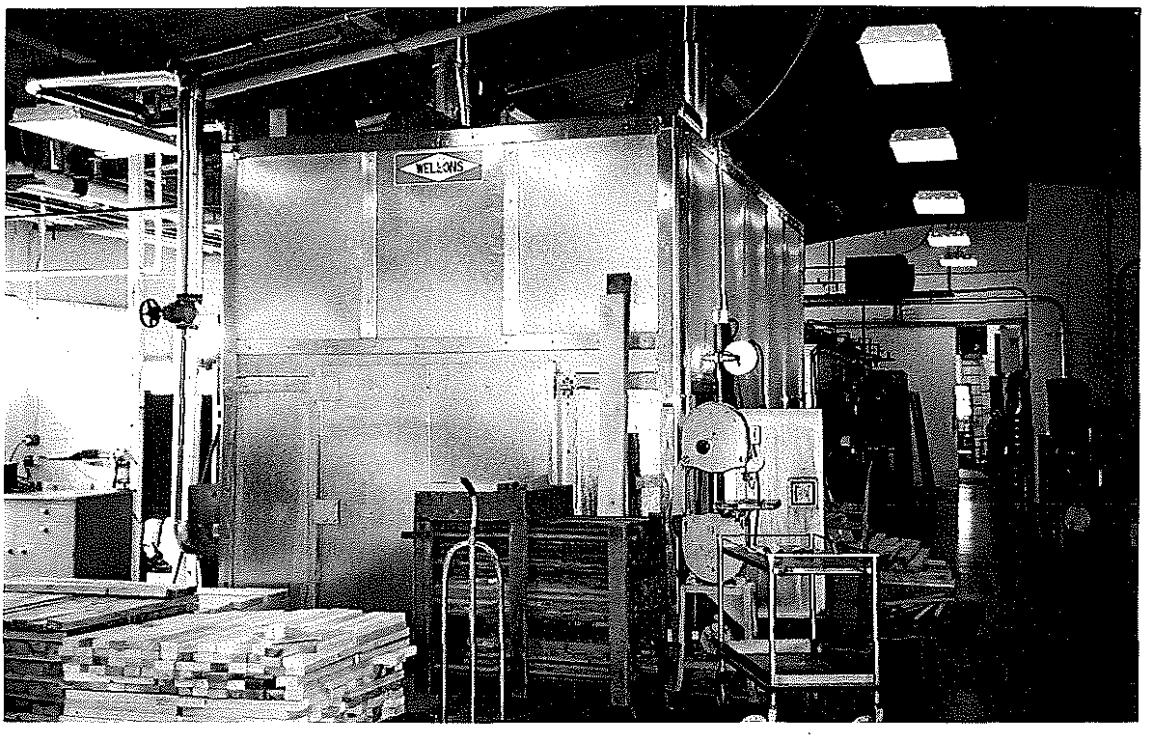


Figure 4

16 ft. Wellons Kiln (Opposite End)

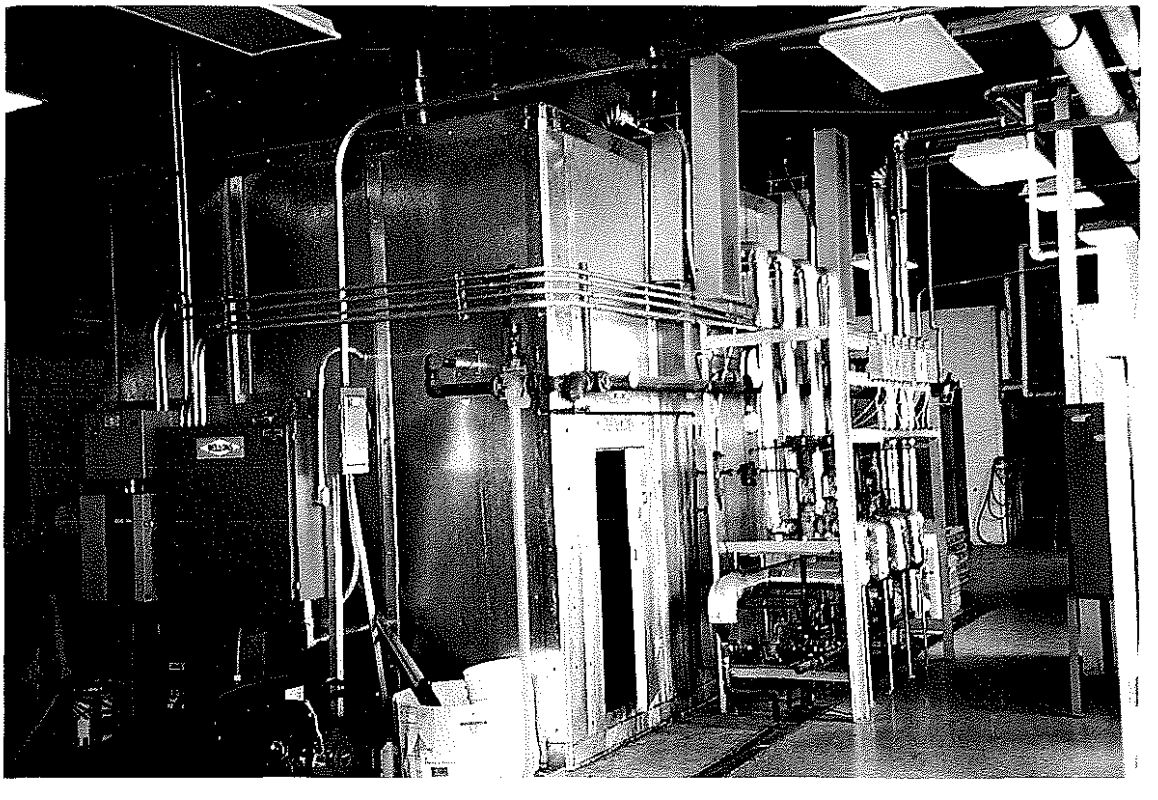


Figure 5
Kiln Exhaust Ducts (West Side)

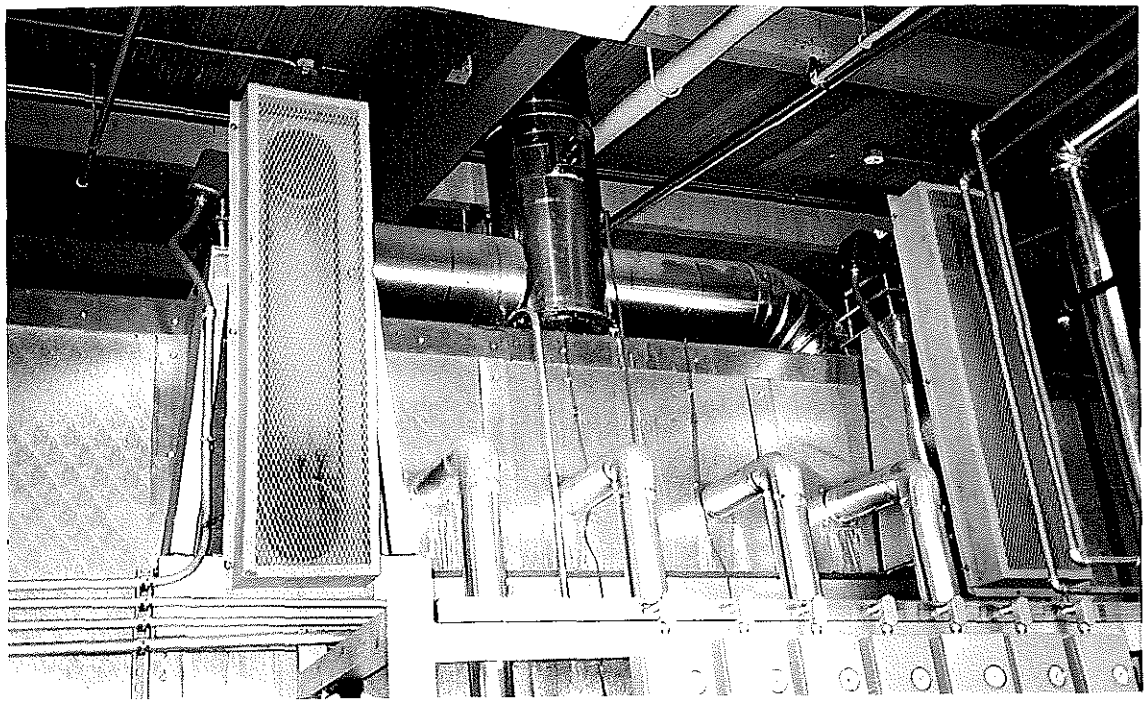


Figure 6
East Side of Kiln Interior (no lumber)

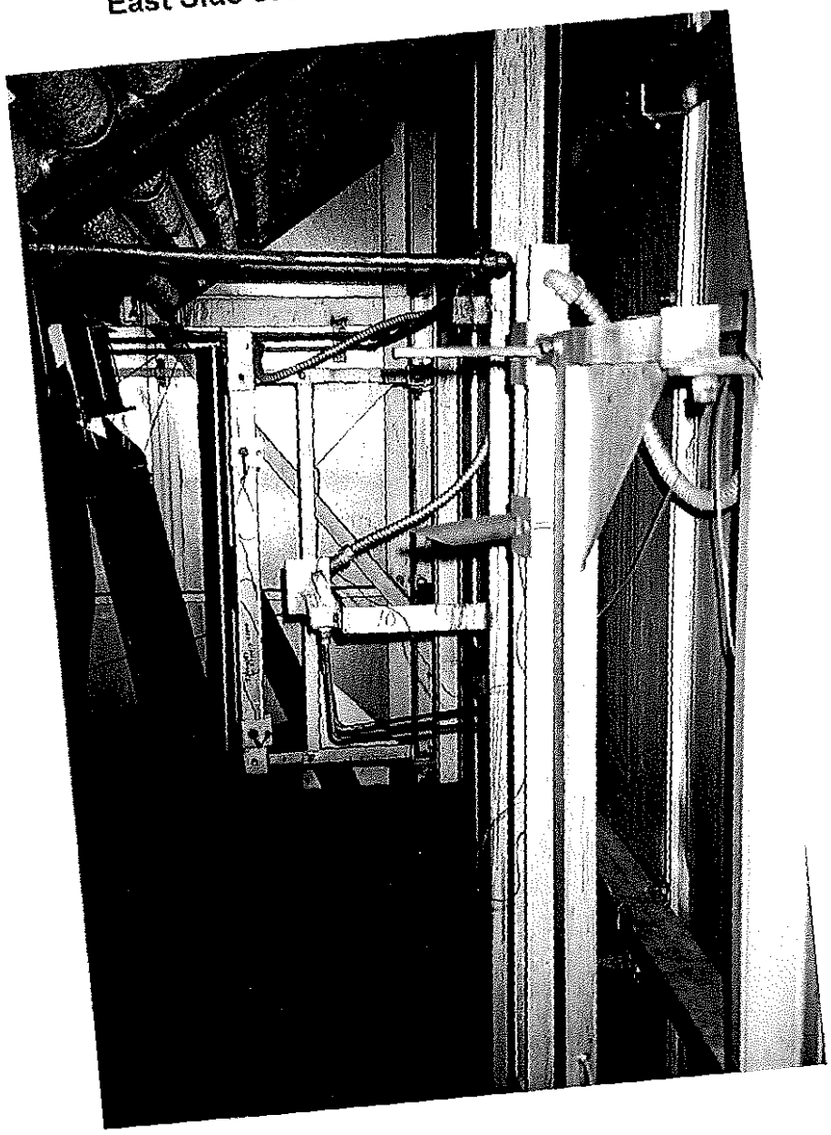


Figure 7
Rooftop Sampling

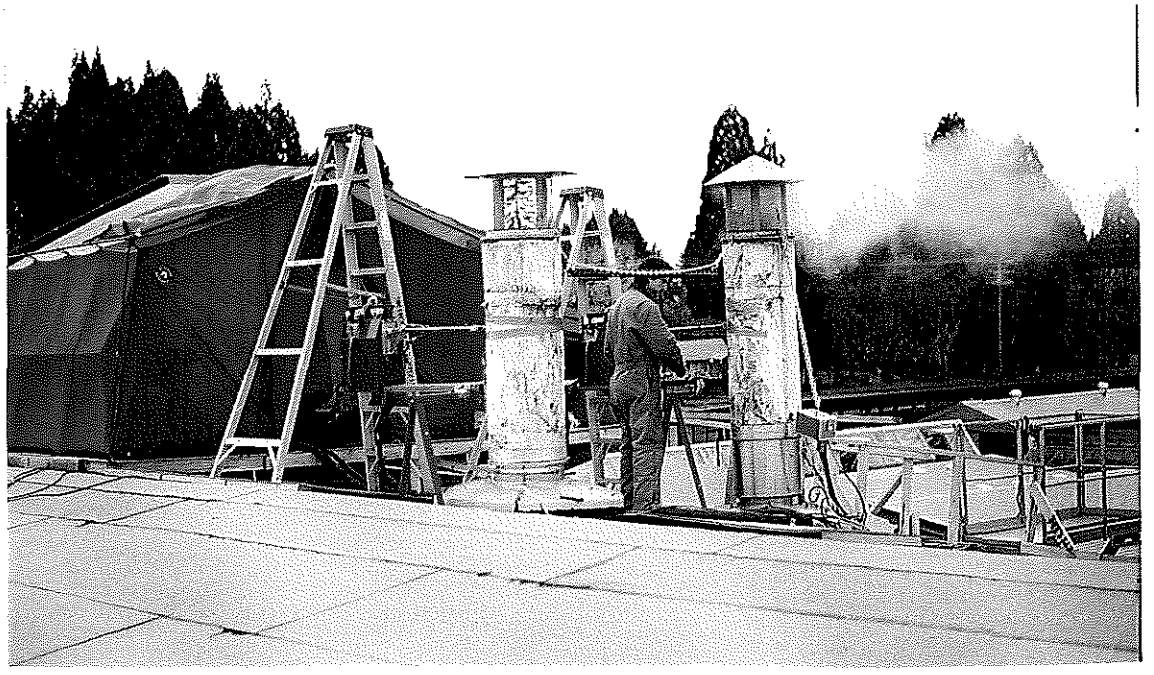


Figure 8
Exhausts During Testing (Skin Removed)

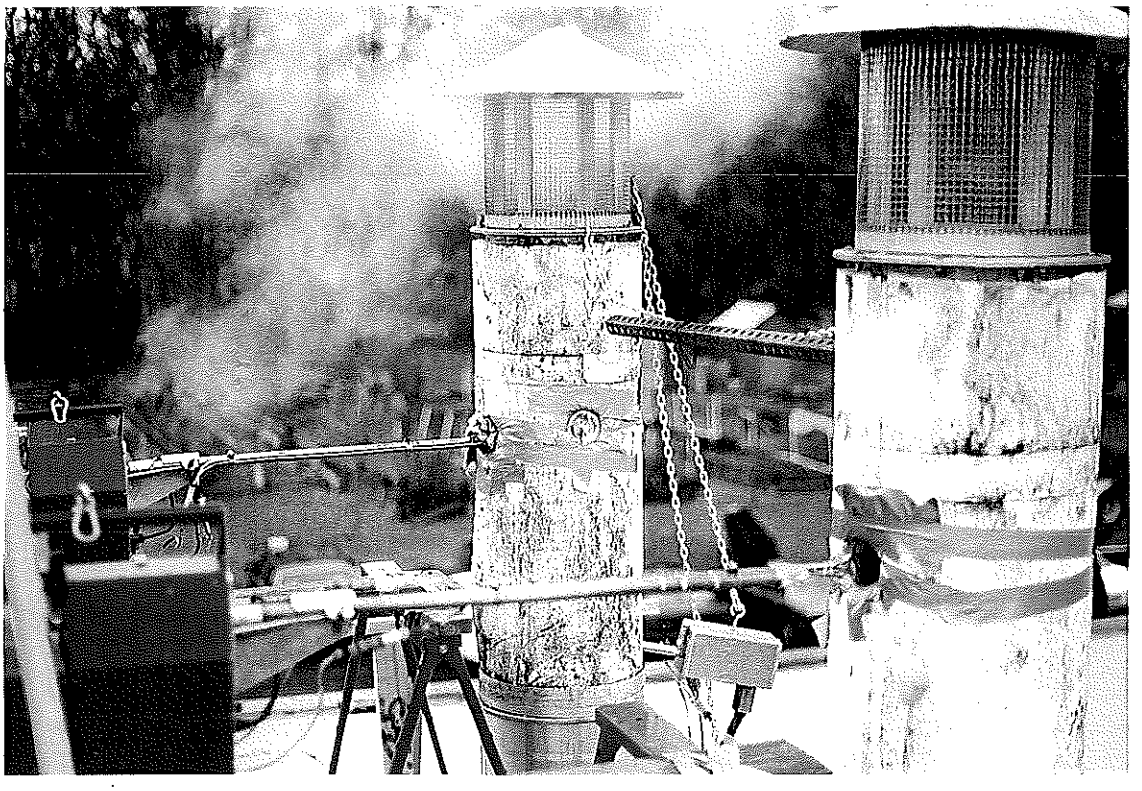


Figure 9

Close-up of Exhaust Outlet (after nine years)

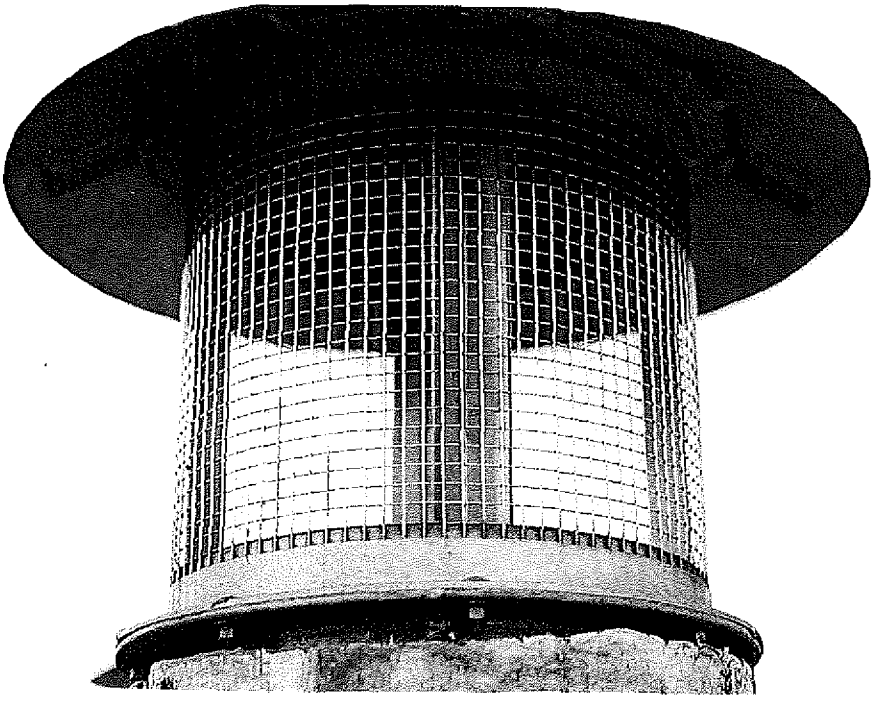


Figure 10

Particulate Control Boxes During Sampling

APPENDIX

Nomenclature & Drift Correction Documentation

Total Particulate

- Particulate Emissions Summary
- Particulate Emissions Determinations
- Sample Calculations
- Field Data Sheets
- Blank Correction Sheets
- Laboratory Results and Worksheets
- Moisture Catch Sheets
- Moisture Catch Field Data Sheets
- Traverse Point Locations

Gases

- TGOC Emissions Summaries
- Gaseous Determinations (Bias Checks)
- Data Logger Gas Charts
- Strip Chart
- Calibration Gas Certificates

Calibration Data

- Meter Box
- Pitots
- Micromanometer
- Thermocouples and Indicators
- Nozzle Diameters
- Barometer

Kiln Information

Administrative

- Source Test Plan and Correspondence

NOMENCLATURE
AND
DRIFT CORRECTION
DOCUMENTATION

Nomenclature

Constants	Value	Units	Definition	Ref
Pstd(1)	29.92129	inHg	Standard Pressure	CRC
Pstd(2)	2116.22	lbf / ft²		CRC
Tstd	527.67	°R	Standard Temperature	CRC
R	1545.33	ft lbf / lbmol °R	Ideal Gas Constant	CRC
MWatm	28.965	lbm / lbmole	Atmospheric (20.946 %O2, 0.033% CO2, Balance N2+Ar)	
MWc	12.011	lbm / lbmole	Carbon	CRC
MWco	28.010	lbm / lbmole	Carbon Monoxide	CRC
MWco2	44.010	lbm / lbmole	Carbon Dioxide	CRC
MWh2o	18.015	lbm / lbmole	Water	CRC
MWno2	46.006	lbm / lbmole	Nitrogen Dioxide	CRC
MWo2	31.999	lbm / lbmole	Oxygen	CRC
MWso2	64.063	lbm / lbmole	Sulfur Dioxide	CRC
MWn2+ar	28.154	lbm / lbmole (Balance with 98.82% N2 & 1.18% Ar)	Emission balance	
C1	385.3211	ft³ / lbmol	Ideal Gas Constant @ Standard Conditions	
C2	816.5455	inHg in²/ °R ft²	Isokentics units correction constant	
Kp	5129.4	ft / min [(inHg lbm/mole) / (°R inH2O)] ^½	Pitot tube constant	Ref 2.5.1

Symbol	Units	Definition	Calculating Equation or Source of Data	EPA
As	in²	Area, Stack		
An	in²	Area, Nozzle		
Bws	%	Moisture, % Stack gas	[100 Vw(std) / [Vw(std)+Vm(std)]]	Eq. 5-3
C	ppmv-C	Carbon (General Reporting Basis for Organics)		
C1	ft3/lbmol	Gas Constant @ Standard Conditions	[R Tstd / Pstd(2)]	
C2	inHg in²/ °R ft²		[14,400 Pstd / Tstd]	
Cd	lbm-GAS / MMdscf	Mass of gas per unit volume	[Cgas MWgas / C1]	
cg	gr/dscf	Grain Loading, Actual	[15.432 mn / Vm(std) 1,000]	Eq. 5-6
cg @ X%CO2	gr/dscf	Grain Loading Corrected to X% Carbon Dioxide	[X% / CO2%]	
cg @ X%O2	gr/dscf	Grain Loading Corrected to X% Oxygen	[(20.946-X%) / (20.946-O2%)]	
Cgas	ppmv, %	Gas Concentration, (Corrected)		
Cgas @ X%CO2	ppmv	Gas Concentration Correction to X% Carbon Dioxide	[X% / CO2%]	
Cgas @ X%O2	ppmv	Gas Concentration Correction to X% Oxygen	[(20.946-X%) / (20.946-O2%)]	
CO	ppmv	Carbon Monoxide		
Co	ft	Outer Circumference of Circular Stack		
Ci	ft	Inner Circumference of Circular Stack		
CO2	%	Carbon Dioxide		
Cp		Pitot tube coefficient		
Ct	lb/hr	Particulate Mass Emissions	[60 cg Qsd/ 7,000]	
dH	in H2O	Pressure differential across orifice		
Dn	in	Diameter, Nozzle		
dp^½		Average square root of velocity pressure		
Ds	in	Diameter, Stack		
E	lb / MMBtu	Pollutant Emission Rate	Cgas Fd MWgas (20.946 / (20.946-O2%)) / (1,000,000 C1)	
Fd	dscf / MMBtu	F Factor for Various Fuels		Table 19-1
I	%	Percent Isokinetic	[C2 Ts(abs) Vm(std) / (vs Ps mfg An Ø)]	Eq. 5-8*
Md	lbm / lbmole	Molecular weight, Dry Stack Gas	[(1-%O2-%CO2)(MWn2+ar)+(%O2 MWo2)+(%CO2 MWco2)	Eq. 3-1*
mfg		Mole fraction of dry stack gas	[1-Bws/100]	
Mgas	lbm/hr	Gaseous Mass Emisisons	[60 Cgas(ppmv) MW Pstd(2) Qsd / 1,000,000 R Tstd]	
mn	mg	Particulate lab sample weight		
Ms	lbm / lbmole	Molecular weight, Wet Stack	[Md mfg +MWh2o (1-mfg)]	Eq. 2-5
MW	lbm / lbmole	Molecular Weight		
NO2	ppmv-NO2	Nitrogen Dioxide (General Reporting Basis for NOx)		
NOx	ppmv-NO2	Nitrogen Oxides (Reported as NO2)		
O2	%	Oxygen		
OPC	%	Opacity		
Pbar	in Hg	Pressure, Barometric		
Pg	in H2O	Pressure, Static Stack		
Po	in Hg	Pressure, Absolute across Orifice	[Pbar+dH/13.5955]	
Ps	in Hg	Pressure, Absolute Stack	[Pbar+Pg/13.5955]	Eq. 2-6*
Qa	acf/min	Volumetric Flowrate, Actual	[As vs / 144]	
Qsd	dscf/min	Volumetric Flowrate, Dry Standard	[Qa Tstd mfg Ps] / [Pstd(1) Ts(abs)]	Eq 2-10*
Rf	MMBtu/hr		[1,000,000 Mgas (20.946-O2)]/ [Cd Fd 20.946]	
SO2	ppmv-SO2	Sulfur Dioxide		
t	in	Wall thickness of a stack or duct		
TGOC	ppmv-C	Total Gaseous Organic Concentration (Reported as C)		
Tm	°F	Temperature, Dry gas meter		
Tm(abs)	°R	Temperature, Absolute Dry Meter	[Tm + 459.67]	
Ts	°F	Temperature, Stack gas		
Ts(abs)	°R	Temperature, Absolute Stack gas	[Ts + 459.67]	
Vlc	ml	Volume of condensed water		
Vm	dcf	Volume, Gas sample		
Vm(std)	dscf	Volume, Dry standard gas sample	[Y Vm Tstd Po]/ [Pstd(1) Tm(abs)]	Eq. 5-1
vs	fpm	Velocity, Stack gas	Kp Cp dp^½ [Ts(abs) / (Ps Ms)]^ ½	Eq. 2-9*
Vw(std)	scf	Volume, Water Vapor	0.04707 Vlc	Eq. 5-2
Y		Dry gas meter calibration factor		Fig. 5.6
Ø	min	Time, Total sample		

* Based on equation.

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DRIFT CORRECTION DOCUMENTATION

EPA Drift Equations:

- Method 3A: Oxygen and Carbon Dioxide

$$C_{gas} = \frac{(C_{ma} - C_{oa})(C - C_m) + C_{ma}}{(C_m - C_o)} \qquad \text{(Eq. 3A-1)}$$

- Method 6C: Sulfur Dioxide

$$C_{gas} = \frac{C_{ma}(C - C_o)}{(C_m - C_o)} \qquad \text{where } C_{oa} = 0 \qquad \text{(Eq. 6C-1)}$$

- Method 7E: Nitrogen Oxides, Section 8 of Method 7E states: "Follow Section 8 of Method 6C (Eq. 6C-1)"
- Method 10: Carbon Monoxide, the EPA does not currently address Gas Filter Correlation instruments, therefore there are no current standards.
- Method 25A: Total Gaseous Organic Concentration (TGOC), this method does not mention correcting for drift although there are established limits.

Horizon Engineering Drift Correction Equations:

$$C_{gas} = \frac{(C_{id} - Z_x)(C_{ma} - C_{oa})}{(S_x - Z_x)} \qquad S_x = \frac{C_{mf} - C_{mi})(T_x - T_{ci})}{(T_{cf} - T_{ci})} + C_{mi}$$

$$Z_x = \frac{(C_{of} - C_{oi})(T_x - T_{ci})}{(T_{cf} - T_{ci})} - + C_{oi} \qquad T_x = \frac{(T_{te} - T_{ts})}{2} + T_{ts}$$

EPA	Definition	Horizon
C_{gas}	Effluent gas concentration, dry basis	C_{gas}
C_{ma}	Actual upscale calibration gas concentration	C_{ma}
C_{oa}	Actual zero/low calibration gas concentration	C_{oa}
C_m	Average of initial and final system upscale calibration bias responses	
	Initial system upscale calibration bias response	C_{mi}
	Final system upscale calibration bias response	C_{mf}
C_o	Average of initial and final system zero/low calibration bias responses	
	Initial system zero/low calibration bias response	C_{oi}
	Final system zero/low calibration bias response	C_{of}
C	Average gas concentration indicated by gas analyzer, dry basis	C_{id}
	Starting test time	T_{ts}
	Ending test time	T_{te}
	Initial system bias calibration response time	T_{ci}
	Final system bias calibration response time	T_{cf}
	Mid-point of test time or gas sampling interval to be analyzed	T_x
	Approximate upscale response at mid-point test time	S_x
	Approximate zero/low response at mid-point test time	Z_x

Notes or exceptions:
TGOC is first recorded on a wet basis, then corrected to a dry basis
The TGOC instruments used by Horizon have some historic data on instrument response to different hydrocarbons. For propane the response is 1 to 1 molecule while methane is 1.037 to 1 molecule. We correct for the instrument's "over response" to methane.

TOTAL PARTICULATE

Particulate Emissions - Cycle No.1 Summary

Willamette Ind. - OSU
Cycle No. 1 Douglas Fur - Particulate
Dec 14-16, 1998

Run ID	Start	End	Test min	Interval Time min	Bws Kiln	Qsd dscfm	Isokinetics %
1	08:52	10:12	75.0	80.0	5.7%	181.9	88.5
	10:12	10:26		14.0			
2	10:26	13:49	180.0	203.0	17.7%	50.1	109.9
	13:49	13:53		4.0			
3	13:53	16:44	165.0	171.0	20.5%	81.8	100.7
	16:44	16:55		11.0			
4	16:55	19:50	175.0	175.0	12.2%	73.6	100.4
	19:50	19:55		5.0			
5	19:55	22:50	175.0	175.0	18.8%	66.1	112.7
	22:50	22:55		5.0			
6	22:55	01:44	165.0	169.0	20.4%	61.1	102.8
	01:44	01:56		12.0			
7	01:56	04:45	165.0	169.0	23.0%	46.0	116.4
	04:45	04:57		12.0			
8	04:57	07:55	175.0	178.0	22.7%	48.3	107.4
	07:55	07:58		3.0			
9	07:58	10:53	170.0	175.0	22.8%	57.3	106.2
	10:53	10:58		5.0			
10	10:58	13:52	170.0	174.0	23.0%	49.4	105.8
	13:52	13:57		5.0			
11	13:57	16:53	175.0	176.0	23.5%	57.4	110.3
	16:53	16:57		4.0			
12	16:57	19:52	175.0	175.0	20.4%	59.4	103.7
	19:52	19:56		4.0			
13	19:56	22:51	175.0	175.0	22.0%	56.3	113.8
	22:51	22:58		7.0			
14	22:58	01:51	170.0	173.0	21.7%	50.9	109.5
	01:51	01:56		5.0			
15	01:56	04:45	170.0	169.0	22.6%	70.4	109.2
	04:45	04:59		14.0			
16	04:59	07:57	175.0	178.0	22.2%	46.5	109.1
	07:57	08:17		20.0			
17	08:17	11:07	165.0	170.0	24.5%	76.4	100.0
	11:07	11:16		9.0			
18	11:16	14:09	170.0	173.0	31.2%	45.0	106.9
	14:09	14:15		6.0			
19	14:15	17:31	175.0	196.0	32.6%	53.3	105.6
	17:31	17:35		4.0			
20	17:35	20:30	175.0	175.0	30.4%	47.9	102.5
	20:30	20:36		6.0			
21	20:36	21:52	75.0	76.0	29.0%	53.6	100.7
	21:52	22:17		25.0			

		Time Weighted Averages				
		H2O %	Qsd dscfm	Iso %	gr/dscf	lbm/hr
Total Cycle Time	3,685 min					
Total Test Interval	3,660 min					
Total Actual Testing Time	3,415 min	22.5%	60.3	106.5	0.0016	0.0008
Percent Actual Testing of Cycle Time	92.7%					

Production 2,560 bft
0.018 lbm/Mdbft (For actual testing time)
0.020 lbm/Mdbft (Corrected for untested intervals between runs and port changes)

NOTES
[A] Emissions for untested intervals are time weighted average of previous and following tests.
[B] Results for individual runs are not availiable

Particulate Emissions - Cycle No.2 Summary

Willamette Ind. - OSU
Cycle No. 2 Douglas Fur - Particulate
Dec 16-19, 1998

Run ID	Start	End	Test min	Interval Time min	Bws Kiln	Qsd dscfm	Isokinetics %
1	23:07	00:32	85.0	85.0	4.2%	247.3	36.9
	00:32	00:37		5.0			
2	00:37	03:34	175.0	177.0	18.3%	45.3	103.0
	03:34	03:37		3.0			
3	03:37	06:29	170.0	172.0	20.6%	53.9	95.0
	06:29	06:37		8.0			
4	06:37	09:28	170.0	171.0	20.3%	61.1	105.0
	09:28	09:36		8.0			
5	09:36	12:31	155.0	175.0	20.8%	75.8	105.2
	12:31	12:36		5.0			
6	12:36	15:33	175.0	177.0	23.0%	53.2	108.2
	15:33	15:37		4.0			
7	15:37	18:35	175.0	178.0	22.6%	89.0	104.9
	18:35	18:37		2.0			
8	18:37	21:35	175.0	178.0	22.7%	62.7	103.3
	21:35	21:37		2.0			
9	21:37	00:30	170.0	173.0	22.7%	76.2	115.5
	00:30	00:39		9.0			
10	00:39	03:32	170.0	173.0	22.6%	44.2	112.0
	03:32	03:40		8.0			
11	03:40	06:31	150.0	171.0	23.0%	81.8	108.2
	06:31	06:40		9.0			
12	06:40	09:29	165.0	169.0	22.9%	49.2	108.0
	09:29	09:38		9.0			
13	09:38	12:30	165.0	172.0	17.9%	79.2	98.5
	12:30	12:38		8.0			
14	12:38	15:31	170.0	173.0	17.1%	54.6	100.4
	15:31	15:39		8.0			
15	15:39	18:35	175.0	176.0	17.8%	92.8	103.6
	18:35	18:40		5.0			
16	18:40	21:47	170.0	187.0	17.0%	52.0	111.2
	21:47	21:55		8.0			
17	21:55	00:48	170.0	173.0	17.1%	93.5	111.9
	00:48	00:57		9.0			
18	00:57	03:50	170.0	173.0	17.3%	50.4	109.2
	03:50	03:59		9.0			
19	03:59	06:52	170.0	173.0	30.6%	68.2	125.8
	06:52	06:57		5.0			
20	06:57	09:49	170.0	172.0	29.0%	45.6	106.0
	09:49	09:55		6.0			
21	09:55	11:15	80.0	80.0	33.9%	57.3	102.6
	11:15	11:21		6.0			

			Time Weighted Averages				
			H2O %	Qsd dscfm	Iso %	gr/dscf	lbm/hr
Total Cycle Time	3,614	min					
Total Test Interval	3,608	min					
Total Actual Testing Time	3,375	min	21.1%	69.0	105.2	0.0017	0.0010
Percent Actual Testing of Cycle Time	93.4%						

Production 2,304 bft
0.025 lbm/Mdbft (For actual testing time)
0.027 lbm/Mdbft (Corrected for untested intervals between runs and port changes)

NOTES
[A] Emissions for untested intervals are time weighted average of previous and following tests.
[B] Results for individual runs are not availiable

Particulate Data Summation 1 of 2

Client	Willamette Industries - OSU													14-Dec-98	Date
Source	Kiln Test No. 2 Cycle No. 1 Douglas Fir													drb	Operator
Location	Corvalis, OR													part_gas	File
Methods	EPA 1-4, ODEQ 5													mew	Analysist/QA
Definitions	Symbol	Units	1	2	3	4	5	6	7	8	9	10	11	Sum	Average
			West	East	West	East	West	East	West	East	West	East	West		Time Weight
Date			14-Dec	14-Dec	14-Dec	14-Dec	14-Dec	14-Dec	15-Dec	15-Dec	15-Dec	15-Dec	15-Dec		
Time, Starting			08:52	10:26	13:53	16:55	19:55	22:55	01:56	04:57	07:58	10:58	13:57		
Time, Ending			10:12	13:49	16:44	19:50	22:50	01:44	04:45	07:55	10:53	13:52	16:53		
			80.0	203.0	171.0	175.0	175.0	169.0	169.0	178.0	175.0	174.0	176.0	3,505	
Volume, Gas sample	Vm	dcf	55.082	47.497	64.926	61.636	62.164	49.341	41.985	43.315	48.982	42.399	53.246	1,030.915	
Temperature, Dry gas meter	Tm	°F	48.1	78.5	70.4	76.1	68.8	74.7	66.5	75.8	64.8	75.9	73.0		70.5
Temperature, Stack gas	Ts	°F	103.4	135.7	144.1	123.2	139.4	142.6	148.8	147.3	148.5	146.8	149.7		146.3
Temperature, Stack Dry Bulb	Tdb	°F	na	na	na	na	na	na	na	na	na	na	na		
Temperature, Stack Wet Bulb	Twb	°F	na	na	na	na	na	na	na	na	na	na	na		
Pressure differential across orifice	dH	in H2O	1.871	0.203	0.575	0.376	0.331	0.302	0.166	0.191	0.272	0.202	0.276		
Average square root velocity pressure	dp^½	in H2O^½	0.054	0.018	0.029	0.024	0.023	0.022	0.017	0.018	0.021	0.018	0.021		
Diameter, Nozzle	Dn	in	**0.9880**	**0.9880**	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880		
Pitot tube coefficient	Cp		**0.8054**	**0.7900**	0.8054	0.7900	0.8054	0.7900	0.8054	0.7900	0.8054	0.7900	0.8054		
Dry gas meter calibration factor	Y		**0.9773**	**0.9897**	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773		
Pressure, Barometric	Pbar	in Hg	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90		
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Time, Total sample	Ø	min	75.0	180.0	165.0	175.0	175.0	165.0	165.0	175.0	170.0	170.0	175.0	3,415	
Stack Area	As	in²	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5		
Nozzle Area	An	in²	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667		
Volume of condensed water	Vlc	ml	75.1	217.4	357.6	289.5	326.6	295.5	270.5	272.5	311.6	271.5	347.6		
Particulate sample weight-Total	mn	mg												108.32	
Oxygen	Atmos.	% O2	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95		
Carbon Dioxide	Atmos.	% CO2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
Molecular weight, Dry Stack	Md	lbm / lbmole	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**	**28.96**		
Pressure, Absolute Stack	Ps	in Hg	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90	30.90		
Pressure, avg arcoss orifice	Po	in Hg	31.04	30.91	30.94	30.93	30.92	30.92	30.91	30.91	30.92	30.91	30.92		
Volume, Dry standard gas sample	Vm(std)	dscf	58.03	47.62	65.32	62.10	62.70	49.83	42.51	43.65	49.77	42.71	53.27	1,042.420	
Volume, Water Vapor	Vw(std)	scf	3.54	10.23	16.83	13.63	15.37	13.91	12.73	12.83	14.66	12.78	16.36	303.715	
Moisture, % Stack (EPA 4)	Bws(1)	%	**5.74**	**17.69**	**20.49**	18.00	19.69	21.82	**23.05**	**22.71**	**22.76**	**23.03**	**23.50**		23.08
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	6.84	17.11	21.22	**12.16**	**18.83**	**20.43**	23.83	23.01	23.70	22.72	24.42		23.10
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Psychometry)	Bws(4)	%	na	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Predicted)	Bws(5)	%	15.0	15.0	20.0	20.0	20.0	20.0	15.0		19.0		18.0		
Mole Fraction dry Gas	mfg		**94.3%**	**82.3%**	**79.5%**	**87.8%**	**81.2%**	**79.6%**	**77.0%**	**77.3%**	**77.2%**	**77.0%**	**76.5%**		
Molecular weight, Wet Stack	Ms	lbm / lbmole	28.34	27.03	26.72	27.63	26.90	26.73	26.44	26.48	26.47	26.44	26.39		
Velocity, Stack gas	vs	fpm	180.0	60.0	102.9	80.9	80.8	76.7	60.3	62.8	74.8	64.5	75.8		77.5
Volumetric Flowrate, Actual	Qa	acf/min	199.4	66.5	113.9	89.6	89.5	84.9	66.8	69.6	82.8	71.4	84.0		85.8
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	181.9	50.1	81.8	73.6	66.1	61.1	46.0	48.3	57.3	49.4	57.4		60.3
Percent Isokinetic	I	%	88.5	109.9	100.7	100.4	112.7	102.8	116.4	107.4	106.2	105.8	110.3		106.5
Grain Loading, Actual	cg	gr / dscf													0.0016
		mg / dscm													3.7
Particulate Mass Emissions	Ct	lbm / hr													0.0008
		gm / hr													0.38

Particulate Data Summation 2 of 2

Client	Willamette Industries - OSU												14-Dec-98	Date
Source	Kiln Test No. 2 Cycle No. 1 Douglas Fir												drb	Operator
Location	Corvalis, OR												part_gas	File
Methods	EPA 1-4, ODEQ 5												mew	Analysist/QA
Definitions	Symbol	Units	12	13	14	15	16	17	18	19	20	21	Sum	Average
			East	West	East	West	East	West	East	West	East	West		Time Weight
Date			15-Dec	15-Dec	15-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec		
Time, Starting			16:57	19:56	22:58	01:56	04:59	08:17	11:16	14:15	17:35	20:36		
Time, Ending			19:52	22:51	01:51	04:45	07:57	11:07	14:09	17:31	20:30	21:52		
			175.0	175.0	173.0	169.0	178.0	170.0	173.0	196.0	175.0	76.0	3,505	
Volume, Gas sample	Vm	dcf	51.445	53.281	44.845	61.708	42.100	60.093	38.790	47.052	41.525	19.503	1,030.915	
Temperature, Dry gas meter	Tm	°F	76.0	66.8	71.8	63.5	72.1	64.0	67.4	64.2	77.8	69.1		70.5
Temperature, Stack gas	Ts	°F	142.5	145.4	145.3	150.2	146.5	153.1	159.7	163.8	161.6	156.6		146.3
Temperature, Stack Dry Bulb	Tdb	°F	na	na	na	na	na	na	na	na	na	na		
Temperature, Stack Wet Bulb	Twb	°F	na	na	na	na	na	na	na	na	na	na		
Pressure differential across orifice	dH	in H2O	0.281	0.269	0.216	0.410	0.172	0.465	0.168	0.241	0.174	0.236		
Average square root velocity pressure	dp^½	in H2O^½	0.022	0.020	0.019	0.026	0.017	0.029	0.019	0.022	0.020	0.021		
Diameter, Nozzle	Dn	in	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880		
Pitot tube coefficient	Cp		0.7900	0.8054	0.7900	0.8054	0.7900	0.8054	0.7900	0.8054	0.7900	0.8054		
Dry gas meter calibration factor	Y		0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773		
Pressure, Barometric	Pbar	in Hg	30.90	30.90	30.90	30.90	30.90	30.60	30.60	30.60	30.60	30.60		
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Time, Total sample	Ø	min	175.0	175.0	170.0	170.0	175.0	165.0	170.0	175.0	175.0	75.0	3,415	
Stack Area	As	in²	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5		
Nozzle Area	An	in²	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667		
Volume of condensed water	Vlc	ml	308.5	323.6	268.5	390.7	259.5	417.7	398.7	486.9	383.7	179.3		
Particulate sample weight-Total	mn	mg											108.32	
Oxygen	Atmos.	% O2	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95		
Carbon Dioxide	Atmos.	% CO2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96		
Pressure, Absolute Stack	Ps	in Hg	30.90	30.90	30.90	30.90	30.90	30.60	30.60	30.60	30.60	30.60		
Pressure, avg arcoss orifice	Po	in Hg	30.92	30.92	30.92	30.93	30.91	30.63	30.61	30.62	30.61	30.62		
Volume, Dry standard gas sample	Vm(std)	dscf	51.82	53.93	45.53	62.88	42.72	60.58	39.32	47.39	41.28	19.46	1,042.420	
Volume, Water Vapor	Vw(std)	scf	14.52	15.23	12.64	18.39	12.21	19.66	18.77	22.92	18.06	8.44	303.715	
Moisture, % Stack (EPA 4)	Bws(1)	%	21.89	22.02	21.73	22.63	22.23	24.50	32.31	32.59	30.43	30.25		23.08
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	20.38	21.93	21.87	24.70	22.56	26.76	31.22	34.29	32.60	29.04		23.10
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Psychometry)	Bws(4)	%	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Predicted)	Bws(5)	%	18.0	18.0	18.0	18.0		24.5	25.0	25.0	28.0	25.0		
Mole Fraction dry Gas	mfg		79.6%	78.0%	78.3%	77.4%	77.8%	75.5%	68.8%	67.4%	69.6%	71.0%		
Molecular weight, Wet Stack	Ms	lbm / lbmole	26.73	26.55	26.59	26.49	26.53	26.28	25.55	25.40	25.63	25.78		
Velocity, Stack gas	vs	fpm	74.5	72.4	65.2	92.0	60.1	103.7	67.8	82.5	71.5	77.9		77.5
Volumetric Flowrate, Actual	Qa	acf/min	82.5	80.2	72.2	101.9	66.6	114.9	75.1	91.4	79.2	86.3		85.8
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	59.4	56.3	50.9	70.4	46.5	76.4	45.0	53.3	47.9	53.6		60.3
Percent Isokinetic	I	%	103.7	113.8	109.5	109.2	109.1	100.0	106.9	105.6	102.5	100.7		106.5
Grain Loading, Actual	cg	gr / dscf												0.0016
		mg / dscm												3.7
Particulate Mass Emissions	Ct	lbm / hr												0.0008
		gm / hr												0.38

Particulate Data Emissions 1 of 2

Client	Willamette Industries - OSU														16-Dec-98	Date
Source	Kiln Test No. 2 Cycle No. 2 Douglas Fir														drb	Operator
Location	Corvalis, OR														part_gas	File
Methods	EPA 1-4, ODEQ 5														mew	Analysist/QA
Definitions	Symbol	Units	1	2	3	4	5	6	7	8	9	10	11	12	Sum	Average
			West	East	West	East	West	East	West	East	West	East	West	East		Time Weight
Date			16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	17-Dec	17-Dec	17-Dec	17-Dec	17-Dec	17-Dec		
Time, Starting			23:07	00:37	03:37	06:37	09:36	12:36	15:37	18:37	21:37	00:39	03:40	06:40		
Time, Ending			00:32	03:34	06:29	09:28	12:31	15:33	18:35	21:35	00:30	03:32	06:31	09:29		
Volume, Gas sample	Vm	dcf	37.432	39.244	41.976	52.517	59.248	48.697	78.743	54.718	72.278	40.239	63.249	42.250	1,126.354	
Temperature, Dry gas meter	Tm	°F	77.8	67.8	76.2	68.9	75.4	72.4	78.0	71.9	79.1	67.0	71.8	65.8		70.0
Temperature, Stack gas	Ts	°F	102.7	138.0	142.0	143.3	142.4	149.0	148.5	150.0	144.7	149.0	150.1	146.9		145.2
Pressure differential across orifice	dH	in H2O	0.755	0.126	0.194	0.276	0.495	0.226	0.633	0.298	0.486	0.155	0.533	0.190		
Average square root velocity pressure	dp^½	in H2O^½	0.075	0.016	0.020	0.022	0.028	0.020	0.033	0.023	0.028	0.016	0.031	0.018		
Diameter, Nozzle	Dn	in	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880		
Pitot tube coefficient	Cp		0.7901	0.8054	0.7901	0.8054	0.7901	0.8054	0.7901	0.8054	0.7901	0.8054	0.7901	0.8054		
Dry gas meter calibration factor	Y		0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773		
Pressure, Barometric	Pbar	in Hg	30.60	30.60	30.60	30.60	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.40		
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Time, Total sample	Ø	min	85.0	175.0	170.0	170.0	155.0	175.0	175.0	175.0	170.0	170.0	150.0	165.0	3,375	160.7
Stack Area	As	in²	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5		
Nozzle Area	An	in²	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667		
Volume of condensed water	Vlc	ml	35.1	206.4	230.4	283.5	330.6	307.5	487.9	339.6	447.8	251.4	405.7	265.5		
Particulate sample weight-Total	mn	mg													125.45	
Oxygen	Atmos.	% O2	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95		
Carbon Dioxide	Atmos.	% CO2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96		
Pressure, Absolute Stack	Ps	in Hg	30.60	30.60	30.60	30.60	30.70	30.70	30.70	30.70	30.70	30.70	30.70	30.40		
Pressure, avg arcoss orifice	Po	in Hg	30.66	30.61	30.61	30.62	30.74	30.72	30.75	30.72	30.74	30.71	30.74	30.41		
Volume, Dry standard gas sample	Vm(std)	dscf	37.27	39.25	41.85	52.44	59.40	48.45	78.59	54.51	71.96	40.44	63.85	42.15	1,127.641	
Volume, Water Vapor	Vw(std)	scf	1.65	9.71	10.85	13.34	15.56	14.48	22.96	15.99	21.08	11.84	19.10	12.50	308.384	
Moisture, % Stack (EPA 4)	Bws(1)	%	4.24	19.84	20.58	20.29	20.76	23.00	22.61	22.68	22.65	22.64	23.02	22.87		21.39
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	6.77	18.32	20.32	20.98	20.48	24.15	23.84	24.71	21.68	24.12	24.79	23.14		22.47
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Psychometry)	Bws(4)	%	na	na	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Predicted)	Bws(5)	%	na	na	na	18.00	na	na	na	na	na	na	na	na		
Mole Fraction dry Gas	mfg		95.8%	81.7%	79.4%	79.7%	79.2%	77.0%	77.4%	77.3%	77.3%	77.4%	77.0%	77.1%		78.9%
Molecular weight, Wet Stack	Ms	lbm / lbmole	28.50	26.96	26.71	26.74	26.69	26.45	26.49	26.48	26.48	26.49	26.44	26.46		
Velocity, Stack gas	vs	fpm	243.0	55.5	68.3	77.3	96.0	70.2	116.7	82.5	99.3	58.0	108.1	65.2		87.4
Volumetric Flowrate, Actual	Qa	acf/min	269.1	61.4	75.7	85.6	106.3	77.7	129.2	91.4	110.0	64.2	119.7	72.2		96.8
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	247.3	45.3	53.9	61.1	75.8	53.2	89.0	62.7	76.2	44.2	81.8	49.2		69.0
Percent Isokinetic	I	%	36.9	103.0	95.0	105.0	105.2	108.2	104.9	103.3	115.5	112.0	108.2	108.0		105.2
Grain Loading, Actual	cg	gr / dscf														0.0017
		mg / dscm														3.9
Particulate Mass Emissions	Ct	lbm / hr														0.0010
		gm / hr														0.46

Particulate Data Emissions 2 of 2

Client	Willamette Industries - OSU											16-Dec-98	Date
Source	Kiln Test No. 2 Cycle No. 2 Douglas Fir											drb	Operator
Location	Corvalis, OR											part_gas	File
Methods	EPA 1-4, ODEQ 5											mew	Analysist/QA
Definitions	Symbol	Units	12	13	14	15	16	17	18	19	20	21	Sum	Average
			East	West	East	West	East	West	East	West	East	West		Time Weight
Date			17-Dec	17-Dec	17-Dec	18-Dec	18-Dec	18-Dec	18-Dec	18-Dec	18-Dec	18-Dec		
Time, Starting			06:40	09:38	12:38	15:39	18:40	21:55	00:57	03:59	06:57	09:55		
Time, Ending			09:29	12:30	15:31	18:35	21:47	00:48	03:50	06:52	09:49	11:15		
Volume, Gas sample	Vm	dcf	42.250	62.363	44.993	81.509	47.237	84.586	44.257	68.485	39.279	23.054	1,126.354	
Temperature, Dry gas meter	Tm	°F	65.8	75.5	67.3	76.0	64.4	66.0	56.5	59.2	61.4	81.4		70.0
Temperature, Stack gas	Ts	°F	146.9	144.0	141.3	142.6	141.2	138.4	143.7	159.9	156.2	162.9		145.2
Pressure differential across orifice	dH	in H2O	0.190	0.444	0.248	0.651	0.208	0.738	0.191	0.500	0.183	0.260		
Average square root velocity pressure	dp^½	in H2O^½	0.018	0.028	0.019	0.033	0.018	0.033	0.017	0.028	0.018	0.025		
Diameter, Nozzle	Dn	in	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880		
Pitot tube coefficient	Cp		0.8054	0.7901	0.8054	0.7901	0.8054	0.7901	0.8054	0.7901	0.8054	0.7901		
Dry gas meter calibration factor	Y		0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897	0.9773	0.9897		
Pressure, Barometric	Pbar	in Hg	30.40	30.40	30.40	30.40	30.40	30.40	30.40	30.40	30.40	30.40		
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Time, Total sample	Ø	min	165.0	165.0	170.0	175.0	170.0	170.0	170.0	170.0	170.0	80.0	3,375	160.7
Stack Area	As	in²	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5	159.5		
Nozzle Area	An	in²	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667	0.7667		
Volume of condensed water	Vlc	ml	265.5	287.5	196.3	371.7	205.4	375.7	199.4	658.2	419.7	246.4		
Particulate sample weight-Total	mn	mg											125.45	
Oxygen	Atmos.	% O2	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95	20.95		
Carbon Dioxide	Atmos.	% CO2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96	28.96		
Pressure, Absolute Stack	Ps	in Hg	30.40	30.40	30.40	30.40	30.40	30.40	30.40	30.40	30.40	30.40		
Pressure, avg arcoss orifice	Po	in Hg	30.41	30.43	30.42	30.45	30.42	30.45	30.41	30.44	30.41	30.42		
Volume, Dry standard gas sample	Vm(std)	dscf	42.15	61.89	44.77	80.86	47.25	85.53	44.94	70.12	39.52	22.62	1,127.641	
Volume, Water Vapor	Vw(std)	scf	12.50	13.53	9.24	17.49	9.67	17.68	9.38	30.98	19.76	11.60	308.384	
Moisture, % Stack (EPA 4)	Bws(1)	%	**22.87**	**17.94**	**17.11**	**17.79**	**16.98**	**17.13**	**17.27**	**30.64**	33.33	**33.90**		21.39
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	23.14	21.52	20.10	20.79	20.06	18.66	21.37	31.57	**28.97**	33.80		22.47
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Psychometry)	Bws(4)	%	na	na	na	na	na	na	na	na	na	na		
Moisture, % Stack (Predicted)	Bws(5)	%	na	na	na	na	na	na	na	na	30.00	na		
Mole Fraction dry Gas	mfg		**77.1%**	**82.1%**	**82.9%**	**82.2%**	**83.0%**	**82.9%**	**82.7%**	**69.4%**	**71.0%**	**66.1%**		78.9%
Molecular weight, Wet Stack	Ms	lbm / lbmole	26.46	27.00	27.09	27.02	27.10	27.09	27.07	25.61	25.79	25.25		
Velocity, Stack gas	vs	fpm	65.2	98.2	66.7	114.5	63.4	113.7	61.9	102.6	66.6	90.9		87.4
Volumetric Flowrate, Actual	Qa	acf/min	72.2	108.7	73.8	126.8	70.2	125.9	68.5	113.6	73.8	100.7		96.8
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	49.2	79.2	54.6	92.8	52.0	93.5	50.4	68.2	45.6	57.3		69.0
Percent Isokinetic	I	%	108.0	98.5	100.4	103.6	111.2	111.9	109.2	125.8	106.0	102.6		105.2
Grain Loading, Actual	cg	gr / dscf												0.0017
		mg / dscm												3.9
Particulate Mass Emissions	Ct	lbm / hr												0.0010
		gm / hr												0.46

Sample Calculation Worksheet

Client/Source/Location WI/Cyc 1, Run4/OSU/East Stack Run # 4

Date 12-14-98 Flow & Isokinetics

Constants	Value	Units	Constants	Value	Units
Pstd(1)	29.92129	inHg	MWc	12.011	lbm / lbmole
Pstd(2)	2116.22	lbf / ft²	MWco2	44.010	lbm / lbmole
Tstd	527.67	°R	MWh2o	18.015	lbm / lbmole
R	1545.33	ft lbf / lbmol °R	MWno2	46.006	lbm / lbmole
C1	385.3211	ft³ / lbmol	MWo2	31.999	lbm / lbmole
C2	816.5455	inHg in³/ °R ft²	MWso2	64.063	lbm / lbmole
MWco	28.010	lbm / lbmole	MWn2+ar	28.154	lbm / lbmole
MWatm	28.965	lbm / lbmole	Kp	5129.4	ft / min [(inHg lbm/mole) / (°R inH2O)] ^½

Symbol	Units	Data Entry	Symbol	Units	Data Entry
Vm	dcf	61.636	Pg	in H2O	0
Tm	°F	76.1	Ø	min	175
Ts	°F	123.2	As	in²	159.5
dH	in H2O	0.376	An	in²	0.766
dp^½	in H2O^½	0.024	Vlc	ml	289.5
Dn	in	0.998	mn	mg	—
Cp		0.79	O2	% O2	20.95
Y		0.99	CO2	% CO2	0.03
Pbar	in Hg	30.9			

Definitions	Symbol	Units	Equations
Molecular weight, Dry Stack	Md	lbm / lbmole	[(1-(%O2/100)-(%CO2/100))(MWn2+ar)]+ [(%O2/100) MWo2]+[(%CO2/100) MWco2]

$Md = [1-(.2095)-(0.0005)]28.15 + [(.2095)(31.99)] + [(.0003)(44.01)] = 28.96$

Pressure, Absolute Stack — Ps — in Hg — [Pbar+Pg/13.5955]

$P_s = 30.90 + 0/13.6 = 30.90$ inHg

Pressure, avg across orifice — Po — in Hg — [Pbar+dH/13.5955]

$P_o = 30.9 + .376/13.5955 = 30.93$ in Hg

Volume, Dry standard gas sample — Vm(std) — dscf — [Y Vm Tstd Po]/ [Pstd(1) Tm (°R)]

$V_{m(std)} = (0.99)(61.636)(527.67)(30.93)/(29.92129)(536) = 62.096$

Volume, Water Vapor — Vw(std) — scf — 0.04707 Vlc

$V_{w(std)} = 0.04707(289.5) = 13.63$ scf

Moisture, % Stack (EPA 4) — Bws(1) — % — 100 {Vw(std) / [Vw(std)+Vm(std)]}

$Bws(1) = 100[13.63/[(13.63 + 62.096)]] = 18.00$

* note this is over saturation, % H_2O @ Sat. is used

Mole fraction gas — mfg — 1-(Bws/100)

$mfg = 1-(12.6/100) = 0.874$

Sample Calculation Worksheet

Client/Source/Location WI/Cycle 1 Run 4/OSU/East Stack Run # 4

Date 12-14-98 Flow & Isokinetics

Definitions	Symbol	Units	Equations
Molecular weight, Wet Stack	Ms	lbm / lbmole	[(Md mfg) +(MWh2o (1-mfg))]

$M_s = [(28.96)(0.87) + (18.015(1-.87))] = 27.54$

Velocity, Stack gas	vs	fpm	Kp Cp dp^½ [Ts(abs) / (Ps Ms)]^ ½

$vs = (5129.4)(0.74)(0.024)\left[(583.2)/(30.9)(27.54)\right]^{1/2} = 80.5$ fpm

Volumetric Flowrate, Actual	Qa	acf/min	[As vs / 144]

$Qa = (159.5)\ 80.5/144 = 89.2$ acf/min

Volumetric Flowrate, Dry Standard	Qsd	dscf/min	[Qa Tstd mfg Ps] / [Pstd(1) Ts(abs)]

$Q_{sd} = (89.2)(527.7)(.874)(30.90)/(29.92)(583.2) = 72.86$

Percent Isokinetic	I	%	[C2 Ts(abs) Vm(std) / (vs Ps mfg An Ø)]

$I = (816.54)(583.2)(62.1)/(80.5)(30.9)(.874)(.766)(175) = 101.7$

Grain Loading, Actual	cg	gr / dscf	[15.432 mn / Vm(std) 1,000]

See total cycle emissions

Particulate Mass Emissions	Ct	lbm / hr	[60 cg Qsd/ 7,000]

Sample Calculation Worksheet

Client/Source/Location WI / Kiln @ OSU — Total Cycle Emissions Run # Cyc 1

Date 12-14-98

Constants	Value	Units	Constants	Value	Units
Pstd(1)	29.92129	inHg	MWc	12.011	lbm / lbmole
Pstd(2)	2116.22	lbf / ft²	MWco2	44.010	lbm / lbmole
Tstd	527.67	°R	MWh2o	18.015	lbm / lbmole
R	1545.33	ft lbf / lbmol °R	MWno2	46.006	lbm / lbmole
C1	385.3211	ft³ / lbmol	MWo2	31.999	lbm / lbmole
C2	816.5455	inHg in³/ °R ft²	MWso2	64.063	lbm / lbmole
MWco	28.010	lbm / lbmole	MWn2+ar	28.154	lbm / lbmole
MWatm	28.965	lbm / lbmole	Kp	5129.4	ft / min [(inHg lbm/mole) / (°R inH2O)] ^½

Symbol	Units	Data Entry		Symbol	Units	Data Entry
Vm	dcf	1030.9		Pg	in H2O	0
Tm	°F	70.5 °R		Ø	min	3/415
Ts	°F	146.3 °R		As	in²	159.5
dH	in H2O	—		An	in²	0.766
dp^½	in H2O^½	—		Vlc	ml	1 —
Dn	in	0.988		mn	mg	108.3
Cp		—		O2	% O2	20.95
Y		—		CO2	% CO2	0.03
Pbar	in Hg	—				

Definitions	Symbol	Units	Equations
Molecular weight, Dry Stack	Md	lbm / lbmole	[(1-(%O2/100)-(%CO2/100))(MWn2+ar)]+ [(%O2/100) MWo2]+[(%CO2/100) MWco2]

Md = [(1-(20.95/100)-(0.03/100))(28.154)] + [(20.95/100) 31.999] + [0.03/100) 44.01] = 28.96

Pressure, Absolute Stack	Ps	in Hg	[Pbar+Pg/13.5955]

See Calculation for Run 4

Pressure, avg across orifice	Po	in Hg	[Pbar+dH/13.5955]
Volume, Dry standard gas sample	Vm(std)	dscf	[Y Vm Tstd Po]/ [Pstd(1) Tm (°R)]
Volume, Water Vapor	Vw(std)	scf	0.04707 Vlc
Moisture, % Stack (EPA 4)	Bws(1)	%	100 {Vw(std) / [Vw(std)+Vm(std)]}
Mole fraction gas	mfg		1-(Bws/100)

Sample Calculation Worksheet

Client/Source/Location WI/Kiln @ OSU - Total Emissions Run # CyC 1

Date 12-14-98

Definitions	Symbol	Units	Equations
Molecular weight, Wet Stack	Ms	lbm / lbmole	[(Md mfg) +(MWh2o (1-mfg))]
See Calculations for Run 4			
Velocity, Stack gas	vs	fpm	Kp Cp dp^½ [Ts(abs) / (Ps Ms)]^ ½
Volumetric Flowrate, Actual	Qa	acf/min	[As vs / 144]
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	[Qa Tstd mfg Ps] / [Pstd(1) Ts(abs)]
Percent Isokinetic	I	%	[C2 Ts(abs) Vm(std) / (vs Ps mfg An Ø)]
Grain Loading, Actual	cg	gr / dscf	[15.432 mn / Vm(std) 1,000]
$cg = (15.432)(108.3)/(1030.9)(1000) = 0.0016$ gr/dscf			
Particulate Mass Emissions	Ct	lbm / hr	[60 cg Qsd/ 7,000]
$Ct = (60)(0.0016)(60.3)/(7000) = 0.00083$ lbm/hr			

Field Data Sheet

orion engineering

Date: 12-14-98
Test Method: 7
Concurrent Testing: 25A
Run #: 1 West Cyc 1
Operator: DRB Support
Temperature, Am (Ta): 38
Pressure, Bar (Pb): 30.9
Pressure, Static (Pstat): 0
Filters: 98m-283 98s-51
Cyclonic Flow ?

Client/Plant/Location: OSU Cyc 1
Probe: 3-2 Cp: 80537 Heat Set: 250
Pitot Leak Check: Pretest ___ in ___ in/min; Post 4 in 0 in/min
Nozzle: .9880
Sample Box: 3 Heat Set: 250
Meter Box: 7 dH@ ___ Y ___
Meter Leak Check: Pretest 0.005 cfm 14 inHg; Post 0.00 cfm 10 inHg
Moisture: 10-20

Stack Diagram

Line	Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (dPs)	Orifice Pressure Desired	Orifice Pressure Actual (dH)	Stack °F (Ts)	Meter Inlet/Avg °F (Tm in)	Meter Outlet °F (Tm out)	Probe °F (Tp)	Oven Filter °F (To)	Impinger Outlet °F (Ti)	Aux °F (Ta)	Pump Vacuum inHg (Pv)
			857gm	328.155				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	1	5			.035		.7	107	41	38	264	261	40		4
2	1	10		322950	.035		.7	106	41	38	264	261	40		4
3	2	15		335.97	.03		2.0	100	46	39	264		40		6
4	2	20			.03		2.0	100	46	39			40		6
5	3	25			.04		2.0	98	49	40			40		6
6	3	30			.04		3.0	98	51	41			40		9
7	4	35		351.995	.045		3.0	98	54	42			40		9
8	4	40	937	356.740	.04		3.0	98	56	44	264	261	40		9
9	5	45			.003	2.0	2.0								7
10	5	50											55		
11	6	55		368.901	.0018	1.2	1.8	106	64	51	261	261	60		6
12	6	60	957	372.62	.0020	1.47	1.5	108	65	53	262	260	61		6
13	6	65			.0020		1.5								6
14	6	70			.0020		1.5								6
15	5	75	1012	383.240	.0020		1.5	118	65	55	261	258	58		6
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															

Notes:

Field Data Sheet

Date	12-14-98
Test Method	7
Concurrent Testing	25A
Run #	2 East Cyc 1
Operator	ORB Support
Temperature, Amb (Ta)	40
Pressure, Bar (Pb)	30.9
Pressure, Static (Pstat)	0
Filters	98m-250 98s-52

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location	OSU Cyc 1
Probe	3-1 Cp .79 Heat Set 250
Pitot / Leak Check	Pretest in / Post in
Nozzle	.988
Sample Box	2 Heat Set 250
Meter Box	4 dH@ Y
Meter / Leak Check	Pretest 0.012 cfm 14 / Post cfm
Moisture	15 Tdb Twb

Traverse Point Number	Sampling Time (Θ) min	Clock Time (Time)	Dry Gas Meter Reading (Vm) cu ft	Velocity Head (ΔPs)	Orifice Pressure (ΔH)	Stack Pressure (ΔPstat)	Stack Temp °F (Ts) Avg:	Meter Temp In °F (Tm in) Avg:	Meter Temp Out °F (Tm out) Avg:	Probe Temp °F (Tp) Avg:	Oven / Filter °F (To) Avg:	Impinger Outlet °F (Ti) Avg:	Aux °F (Ta)	Pump Vacuum in Hg (Pv)
		1026	999.939											
1	5		2.651	.0006		0.5	109	50	47	253	244	39		5
1				.0004		.5								
2			Kiln went down											
2		1055	6.5											
3	20	1100	8.185	.0003	.199	0.2	125	61	59	250	245	45		2
3	25	1105		.0003		.2	121	64	59	256	250	45		2
4	30													
4	35		11.85	.0003		.2	116	68	63	257	251	47		2
5	40			.0004	26	.26	116	68	63	256	251	47		2
5	45		Recal SUM											
6	50													
6	55		17.660	.0003		.26	142	75	68	255	251	47		2
6	60		18.775	.0003		.16	140	76	69	254	251	48		2
6	65			.0002		.16	144	77	71	255	251	48		2
5	70		21.095	.0003		.16	142	79	72	254	251	48		2
5	75		22.22			.16	142	80	73	254	251	48		2
4	80		23.37	.0002		.16	136	82	77	255	251	48		2
4	85		24.444	.0002	.115	.12	135	82	77	254	252	49		2
3	90		25.39	.0003		.12	134	82	77	254	250	49		2
3	95		26.48	.0007	.40	.40	127	83	78	256	251	47		2½
2	100			.0005	.29	.29	127	84	79	234	251	47		2
2	105		30.21	.0004	.23	.23	138	81	80	256	252	50		2
1	110		31.87	.0004		.23	142	87	81	256	252	50		2½
1	115		32.87	.0003	.17	.17	142	87	82	257	251	50		2
1	120		33.864	.0003		.17	142	87	82	255	251	50		2

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cycl

Date 12-14-98

Test Method 4 7

Concurrent Testing 25A

Run # 2 cont

Operator PRB Support

Temperature, Am (Ta) 45

Pressure, Bar (Pb) 30.8

Pressure, Static (Pstat) 0

Probe 3-1 Cp Heat Set °F

Pitot Pretest in in/min

Leak Check Post 3 in 0.0 in/min

Nozzle 988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ 1.768 Y .989

Meter Pretest cfm inHg

Leak Check Post 0.005 cfm 7 inHg

Filters Cyclonic Flow ? Stack Diagram Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1249	33 .864											
1	5		34.985	.0001		0.06	138	84	83	257	253	54		5
1	10		35 .682	.0001		.06	139	85	83	257	251	55		1
2	15	1304	36 .645	.0002	.115	.12	140	85	83	257	252	55		2
2	20	"	"	.0003	.172	.17	140	86	84	257	251	55		2
3	25		38 .77	.0001		.06	140	86	84	256	252	57		2
3	30		39 .555	.0002	.115	.12	140	86	84	258	252	56		2
4	35		40 .590	.0002		.12	141	87	84	253	253	54		2
4	40	1329	41 .77	.0003	.17	.17	141	87	85	256	250	55		2
5	45		42.91	.0003		.17	142	87	85	258	254	56		2
5	50		44 .459	.0005	.287	.29	142	88	85	255	250	55		3
6	55	1344	46 .321	.0005		.29	143	88	85	255	253	55		3
6	60	1349	47 .436	.0004		.23	142	89	86	254	250	55		3
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU / West / cycl

Date 12-14-98

Test Method 7

Concurrent Testing 25A

Run # 3 West cycl

Operator PRB Support

Temperature, Am (Ta) 45

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters .8µ [illegible] 785-9

Probe 3-2 Cp .80 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988"

Sample Box 3 Heat Set [illegible] °F

Meter Box 7 dH@ 1.75 Y .9[illegible]

Meter Pretest 0.005 cfm 14 inHg

Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow ?

Moisture 20 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1353	383.598											
1 1	5		386.908	.0027	.55	1.55	143	70	69	256	256	49		8
2 1	10		—	.0032		1.6								
3 2	15		393.802	.0020	1.09	1.1	144	71	69	261	258	49		6½
4 2	20		—	.0024	1.32	1.3	144	71	69	261	257	51		7
5 3	25		—	.0024		1.3	144	74	70	262	258	52		7
6 3	30		403.65	.0022	1.21	1.2	144	75	70	261	258	52		7
7 4	35		407.20	.0021	1.15	1.15	144	75	70	262	258	54		7
8 4	40		409.790	.0022	1.21	1.2	144	75	71	261	257	55		7
9 5	45		.	.0024	1.32	1.3	144	75	71	262	258	57		7
10 5	50		416.621	.0006		1.25	144							
11 6	55		—	.0002	.11	.11	144	75	71	261	257	59		2
12 6	60		418.750	.0006	.33	.33	144							
13 6	65		420.475	.0007		.36	144	74	71	263	258	58		2
14 6	70		422.075	.0008	.44	.44	144	73	71	262	258	59		2
15 5	75		.	.0005	.27	.27								
16 5	80					.31								
17 4	85		Recal SUM			.1								
18 4	90		.			↓								
19 3	95		430.395	.0007		.31	145	71	69	264	258	67		2
20 3	100		432.264	.0007	.38	.4	144	71	69	264	257	65		2
21 2	105		434.179	.0006		.4	144	71	69	262	256	65		
22 2	110		435.830	.0006	.33	.33	144	71	69	263	257	56		4
23 1	115		437.32	.0005	.27	.27	145	70	68	263	257	55		3
24 1	120	553	439.050	.0006		.33	144	70	68	265	258	55		4
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU/west/cyc 1

Date 12-14-98

Test Method 7

Concurrent Testing 25A

Run # 3 cont cyc 1

Operator JDF Support DRB

Temperature, Amb (Ta) 45

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-283 985-51

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in 0 in/min

Nozzle .988

Sample Box 3 Heat Set °F

Meter Box 7 dH@ Y

Meter Pretest cfm inHg

Leak Check Post .002 cfm 5 inHg

Moisture 20 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1559	439.050											
1 6	5	1604	.	.0003	.166	.17								
2 6	10	1609	441.44											
3 5	15	1614	442.60	.0002	.11	.11	144	69	68	264	258	54		3.0
4 5	20	1619	443.24	.0001	.05	.05	144	69	68	264	257	54		2.5
5 4	25	1624	444.58	.0004	.22	.22	144	69	68	264	258	54		3.0
6 4	30	1629	446.01	.0004	.22	.22	144	69	68	264	257	54		3.0
7 3	35	1634	446.75	.0001	.05	.05	144	68	68	264	258	55		2.5
8 3	40	1639	447.44	.0001	.05	.05	144	68	67	266	258	57		2.5
9 2	45	1644	448.524	.0002	.11	.11	144	68	67	265	257	57		3.0
10			.											
11			.											
12			.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: 050 / Run 4 / East / Cycle 1

Date 12-14-98

Test Method ODEQ M7

Concurrent Testing EPA M25A

Run # 4 East Cycle 1

Operator JDF Support

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-230, 98S-52

Probe 3-1 Cp .79 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ 1.77 Y .99

Meter Pretest 0.002 cfm 12 inHg

Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow? No

Moisture % Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1655	047.67				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5	1700	.	.0019	1.04	1.05	88	63	65	258	249	50		5.5
2 1	10	1705	JUM		BIAS									
3 2	15	1710	.											
4 2	20	1715	059.18	.0010	.55	.55	100	67	63	252	249	61		4.0
5 3	25	1720	061.30	.0008	.47	.47	135	68	63	257	249	62		3.5
6 3	30	1725	063.28	.0004	.24	.24	134	69	64	257	248	59		2.5
7 4	35	1730	064.58	.0001	.06	.06	135	68	65	255	248	53		1.5
8 4	40	1735	065.19	.0003	.17	.17	137	69	65	256	248	51		2.0
9 5	45	1740	066.24	.0003	.17	.17	136	69	65	257	248	50		2.0
10 5	50	1745	066.92	.0001	.06	.06	133	70	66	257	247	51		1.5
11 6	55	1750	068.06	.0003	.17	.17	142	71	67	257	248	52		2.0
12 4	60	1755	069.51	.0005	.28	.28	142	74	69	257	248	56		2.5
13 6	65	1800	070.64	.0003	.17	.17	143	75	69	256	253	55		2.0
14 6	70	1805	072.10	.0005	.28	.28	143	77	70	258	249	57		2.5
15 5	75	1810	073.44	.0004	.24	.24	143	78	71	257	248	58		2.5
16 5	80	1815	074.78	.0004	.24	.24	143	78	72	258	248	61		2.5
17 4	85	1820	076.10	.0004	.24	.24	143	79	72	258	247	64		2.5
18 4	90	1825	076.93	.0002	.11	.11	144	79	73	258	247	65		2.0
19 3	95	1830	077.79	.0002	.11	.11	143	79	74	258	247	58		2.0
20 3	100	1835	078.63	.0002	.11	.11	143	80	75	257	247	48		2.0
21 2	105	1840	080.59	.0009	.50	.50	103	80	75	257	248	47		3.5
22 2	110	1845	082.92	.0011	.65	.65	103	82	77	257	248	49		4.5
23 1	115	1850	084.88	.0008	.48	.48	108	84	77	257	248	48		4.0
24 1	120	1855	086.84	.0008	.48	.48	107	85	78	255	247	45		4.0
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU/K4/Exit/Cycle 1

Date 12-14-98

Test Method ~~PDS~~ ~~BRA~~ M7

Concurrent Testing 25A

Run # 4

Operator JDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-2 ~~80~~ 985-52

Probe 3-1 Cp .79 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ 1.77 Y .99

Meter Pretest cfm inHg

Leak Check Post .005 cfm inHg

Stack Diagram

Cyclonic Flow?

Moisture 20 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1	1	125	1900	088.81	.0008	.48	.48	109	86	79	255	246	45		4.0
2	1	130	1905	091.21	.0011	.66	.66	108	86	78	256	248	48		5.0
3	2	135	1910	093.31	.0009	.54	.54	114	87	80	257	248	50		4.5
4	2	140	1915	095.13	.0007	.42	.42	112	87	80	256	248	50		3.5
5	3	145	1920	097.29	.0009	.54	.54	112	86	81	257	248	52		4.0
6	3	150	1925	099.42	.0009	.54	.54	111	87	81	255	251	52		4.0
7	4	155	1930	101.83	.0012	.73	.73	110	87	81	256	245	54		5.0
8	4	160	1935	103.81	.0008	.48	.48	111	88	81	256	248	57		4.0
9	5	165	1940	105.81	.0008	.48	.48	108	88	82	256	246	56		4.0
10	5	170	1945	107.29	.0004	.24	.24	108	88	82	256	249	57		3.0
11	6	175	1950	109.306	.0008	.48	.48	109	87	82	256	248	58		4.0
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: West OSU cycle 1 Run 5

Date 12-14-98

Test Method OREQ 7

Concurrent Testing EPA 25A

Run # 5

Operator JPF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 99M-293, 985-57

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ Y

Meter Pretest 0.00 cfm 10 inHg

Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow? NO

Moisture 20 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1955	448.801											
1 1	5	2000	41 .	.0029	1.76	1.75	128	65	65	264	260	55		6.0
2 1	10	2005	SCM		B	IAS								
3 2	15	2010												
4 2	20	2015	463.31											
5 3	25	2020	465.19	.0007	.42	.42	138	68	64	264	257	66		3.0
6 3	30	2025	466.46	.0003	.18	.18	141	68	65	263	258	66		2.5
7 4	35	2030	468.22	.0006	.36	.36	138	68	65	261	257	65		3.0
8 4	40	2035	469.83	.0005	.30	.30	139	68	65	261	257	60		3.0
9 5	45	2040	471.34	.0005	.28	.28	139	68	65	263	258	61		3.0
10 5	50	2045	472.65	.0003	.17	.17	139	69	66	264	259	61		2.5
11 6	55	2050	474.40	.0006	.34	.34	140	69	66	263	258	61		3.0
12 6	60	2055	476.14	.0006	.34	.34	140	69	66	261	258	64		3.0
13 6	65	2100	477.57	.0005	.28	.28	140	70	66	263	257	65		3.0
14 6	70	2105	478.71	.0003	.17	.17	137	70	67	264	258	63		2.5
15 5	75	2110	480.67	.0008	.45	.45	140	70	68	265	259	63		4.0
16 5	80	2115	482.51	.0007	.40	.40	140	71	68	264	258	68		3.5
17 5	85	2120	484.32	.0007	.40	.40	140	71	68	263	257	61		3.5
18 4	90	2125	485.79	.0004	.27	.23	140	71	68	256	257	57		3.0
19 3	95	2130	487.81	.0008	.45	.45	136	71	68	264	256	54		3.5
20 3	100	2135	489.58	.0006	.34	.34	141	71	68	257	257	55		3.0
21 2	105	2140	491.12	.0006	.34	.34	136	71	69	262	257	54		3.0
22 2	110	2145	492.73	.0006	.34	.34	140	71	69	267	258	55		3.0
23 1	115	2150	494.24	.0005	.28	.28	141	71	69	254	258	53		3.0
24 1	120	2155	495.72	.0005	.28	.28	141	71	69	263	257	54		3.0
25														

Notes: The M25A probe was not moved to the west stack until ~2200 - two hours of lost data

Field Data Sheet

Orizon Engineering

Client/Plant/Location: QSU / R5 / Cycle 1 / West

Date 12-14-98

Test Method ODEQ 7

Concurrent Testing EPA 25A

Run # 5

Operator SDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98m-283, 985-51

Probe 3-2 Cp — Heat Set 250 °F

Pitot — Pretest — in — in/min

Leak Check — Post — in — in/min

Nozzle .988

Sample Box 3 — Heat Set 250 °F

Meter Box 7 — dH@ — Y

Meter — Pretest — cfm — inHg

Leak Check — Post .008 cfm — 8 inHg

Stack Diagram

Cyclonic Flow? No

Moisture 20 — Tdb NA — Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1 1	125	2200	497.28	.0005	.28	.28	141	71	69	264	257	56		3.0
2 1	130	2205	499.04	.0006	.34	.34	142	71	69	264	258	57		3.5
3 2	135	2210	500.45	.0004	.23	.23	142	71	69	263	258	61		3.0
4 2	140	2215	501.56	.0003	.17	.17	142	71	69	263	257	60		2.5
5 3	145	2220	502.50	.0002	.11	.11	137	71	69	264	256	59		2.5
6 3	150	2225	503.46	.0002	.11	.11	138	70	69	264	257	57		2.5
7 4	155	2230	504.92	.0004	.23	.23	141	70	69	255	257	57		3.5
8 4	160	2235	506.40	.0004	.23	.23	144	70	69	263	257	62		3.5
9 5	165	2240	507.97	.0005	.28	.28	140	71	69	263	257	62		3.5
10 5	170	2245	509.45	.0004	.23	.23	140	71	69	263	257	60		3.0
11 6	175	2250	510.965	.0005	.28	.28	140	71	68	263	257	61		3.5
12 6	180	2255												
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cycle 1

Date 12/14/98

Test Method QSEPM 7

Concurrent Testing 2 SA

Run # 6

Operator CDS Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb)

Pressure, Static (Pstat) 0

Filters 2BM-250, 985-52

Stack Diagram

Cyclonic Flow ?

Probe 3-1 Cp .79 Heat Set 250 °F

Pilot Pretest in in/min

Leak Check Post in in/min

Nozzle

Sample Box Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest .005 cfm 10 inHg

Leak Check Post .003 cfm 10 inHg

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		2255	109.710				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5	2300	112.27	.0019	1.08	1.1	82	67	67	258	250	53		9.0
2 1	10	2305	~~114~~ .	.0002	.11	.11	116	68	66	257	250	50		3.0
3 2	15	2310	114.15	~~.0007~~	~~.40~~	~~.40~~	SUM		BIAS					
4 2	20	2315	115.95	.0007	.40	.40	134	71	68	255	250	53		6.0
5 3	25	2320	117.41	.0005	.28	.28	123	73	69	256	248	52		4.5
6 3	30	2325	118.72	.0004	.23	.23	121	74	70	256	249	49		4.0
7 4	35	2330	120.20	.0005	.28	.28	146	73	68	256	248	49		4.5
8 4	40	2335	121.54	.0004	.23	.23	147	74	69	256	248	56		4.0
9 5	45	2340	123.31	.0007	.40	.40	148	75	70	256	250	56		5.0
10 5	50	2345	124.79	.0005	.28	.28	148	76	71	256	251	59		4.0
11 6	55	2350	126.21	.0006	.34	.34	148	76	71	254	247	56		4.5
12 6	60	2355	128.25	.0006	.34	.34	148	77	72	255	248	56		4.5
13 6	65	2400	129.98	.0007	.40	.40	148	78	72	256	253	58		5
14 6	70		131.83	.0007	.40	.40	148	78	72	255	252	60		5
15 5	75		133.23	.0004	.23	.23	148	78	73	256	253	62		3
16 5	80		134.96	.0006	.34	.34	148	78	73	256	251	55		4
17 4	85		136.72	.0006	.34	.34	148	79	74	254	252	49		4
18 4	90		138.51	.0006	.34	.34	148	78	74	255	252	51		4
19 3	95		140.29	.0007	.40	.40	147	80	75	255	253	53		4
20 3	100		141.92	.0005	.28	.28	148	80	75	256	252	55		3
21 2	105		143.61	.0007	.40	.40	148	80	75	255	252	55		5
22 2	110		145.50	.0007	.40	.40	148	81	75	256	252	57		5
23 1	115		147.41	.0006	.40	.40	148	80	75	255	253	53		5
24 1	120	1256	149.403	.0006	.40	.40	148	80	75	255	253	54		5
25														

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU East Cyclone

Date 12/15/98

Test Method 7

Concurrent Testing 25A

Run # 6

Operator CDS Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb)

Pressure, Static (Pstat) 0

Filters 98M-250, 98S-52 Cyclonic Flow ?

Stack Diagram

Probe Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post 4 in 0 in/min

Nozzle

Sample Box Heat Set 250 °F

Meter Box dH@ 1.76899 Y .98968

Meter Pretest cfm inHg

Leak Check Post cfm inHg

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1258	149.403											
1	5		150.86	.005	.28	.28	144	78	75	257	255	56		3
1	10		152.05	.003	.1704	.17	142	79	75	256	254	58		3
2	15		153.17	.003	.17	.17	142	78	74	255	254	56		3
2	20		154.10	.002	.1136	.11	141	79	75	257	253	56		2
3	25		155.06	.002	.11	.11	148	79	75	257	253	51		2
3	30		156.22	.003	.17	.17	142	78	75	256	253	46		3
4	35		157.17	.002	.11	.11	147	78	75	257	254	53		2
4	40		158.11	.002	.11	.11	142	78	75	258	252	53		2
5	45	1344	159.051	.002	.11	.11	148	78	75	257	253	52		2
5	50		.											
6	55		.											
6	60		.											
			.											
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Notes:

Field Data Sheet

Horizon Engineering

Date 12/15/98
Test Method 7
Concurrent Testing 25A
Run # 7
Operator CDB Support
Temperature, Amb (Ta) 40
Pressure, Bar (Pb)
Pressure, Static (Pstat) 0
Filters 98M-283 9855-51

Client/Plant/Location: OSU West Cycle 1
Probe 3-2 Cp .80537 Heat Set 250
Pilot Pretest in In/m
Leak Check Post in In/m
Nozzle .988
Sample Box Heat Set 250
Meter Box 7 dH@ 1.25783 Y .99229
Meter Pretest 0 cfm 15 In
Leak Check Post cfm In
Moisture 10-20 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (Θ)	Clock Hour (Military)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (ΔPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (ΔH)	STACK °F (Ts) Amb:	AFTER Inlet/Aux °F (Tm in) Amb:	AFTER Outlet °F (Tm out) Amb:	IMPINGER °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vac inHg (Pv)
		156	511.058											
1 1	5		512.40	.0003	.1704	.17	138	62	62	225	230	46		8
1	10			.0003	.17	.17	147	62	61	238	242	50		
2	15		—	Jump	Bias	Check								
2	20		517.05	.0007	.3977	.40	149	61	61	301	252	46		8
3	25		519.02	.0003	.1704	.17	149	61	61	301	252	46		8
3	30		520.52	.0004	.2273	.23	149	63	61	273	252	44		8
4	35		521.91	.0004	.23	.23	149	64	62	275	252	44		6
4	40		523.49	.0004	.23	.23	149	65	62	276	252	44		5
5	45		524.38	.0002	.1136	.11	149	65	63	277	253	46		3
10 5	50		525.68	.0003	.1704	.17	149	66	63	276	252	47		5
11 6	55		526.97	.0003	.1704	.17	149	66	63	275	252	47		5
11 6	60		527.97	.0002	.11	.11	149	67	64	276	254	47		4
11 1	65		529.17	.0003	.1704	.17	149	67	65	278	253	52		5
11 1	70		530.31	.0003	.17	.17	149	68	65	276	254	54		5
11 2	75		532.02	.0004	.2273	.23	149	68	66	275	251	51		5
11 2	80		533.22	.0003	.17	.17	149	69	66	275	251	52		4
11 3	85		534.34	.0003	.17	.17	150	69	66	276	254	53		4
11 3	90	326	535.61	.0003	.17	.17	149	69	66	277	254	54		4
10 1	5	329	536.77	.0003	.17	.17	149	69	68	222	250	54		4
10 1	10		538.27	.0004	.23	.23	150	69	67	277	252	52		4
11 2	15		—	.0002	.11	.11	150	69	68	276	252	54		3
11 2	20		540.64	.0003	.17	.17	149	69	68	276	252	56	4	
11 3	25		542.00	.0002	.11	.11	149	69	68	276	254	59		4
11 3	30		543.04	.0002	.11	.11	150	69	68	276	254	60		4
11														

South Port

East Port

Notes:

Field Data Sheet

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Client/Plant/Location: OSU West

Date 12/15/98

Test Method ODEQ 7

Concurrent Testing

Run # 7

Operator Support

Temperature, Amb (Ta)

Pressure, Bar (Pb)

Pressure, Static (Pstat)

Probe Cp Heat Set

Pitot Pretest in in/m

Leak Check Post 4 in 0 in/m

Nozzle

Sample Box Heat Set

Meter Box dH@ Y

Meter Pretest cfm in/H

Leak Check Post .005 cfm 10 in/H

Moisture Tdb Twb

Filters

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (dP's)	Orifice Pressure (inH2O)	Orifice Pressure Average (inH2O)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm in) Amb:	METER Outlet °F (Tm out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	ABS °F (Ts)	Pump Vacuum inHg (Pv)
			543.04											
1 4	35		—	.0002	.11	.11	150	69	68	277	253	58		4
1 4	40		545.00	.0002	.11	.11	149	69	68	276	251	60		4
1 5	45		545.99	.0002	.11	.11	149	69	68	276	252	61		4
1 5	50		547.46	.0004	.2273	.23	149	70	68	276	252	62		5
1 6	55		—	.0003	.17	.17	149	70	68	276	253	64		5
1 6	60		549.85	.0002	.11	.11	149	71	68	276	253	64		5
1 1	65		550.92	.0002	.11	.11	149	70	69	278	254	63		4
1 1	70		551.98	.0002	.11	.11	149	70	69	278	253	63		4
1 2	75	1445	553.043	.0002	.11	.11	149	71	69	276	252	63		4
10 2	80													
11 3	85													
12 3	90													
13 4														
14 4														
15 5														
16 5														
17 6														
18 6														
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23														
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Notes:

Field Data Sheet

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Date 12/15/98
Test Method M4
Concurrent Testing 25A
Run # 8
Operator CDB Support
Temperature, Amt (Ta) 40
Pressure, Bar (Pb)
Pressure, Static (Pstat) 0
Filters 98M-250, 98S-52

Client/Plant/Location: OSU East Cyclo 1
Probe 3-1 Cp .79 Heat Set 250
Pitot Pretest in In/m
Leak Check Post in In/m
Nozzle .988
Sample Box Heat Set 250
Meter Box 4 dH@ Y .98968
Meter Pretest 0 cfm 1.5 Inf
Leak Check Post cfm Inf

Stack Diagram

Cyclonic Flow?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cum (Vm)	Velocity Head ("H2O) (dPs)	Orifice Pressure ("H2O) (dH) DESIRED	Orifice Pressure ("H2O) (dH) ACTUAL (dH)	STACK °F (Ts) Avg:	METER Inlet °F (Tm in) Avg:	METER Outlet °F (Tm out) Avg:	PROBE °F (Tp) Avg:	OVEN (filter) °F (To) Avg:	IMPINGER Outlet °F (Ti) Avg:	AUX °F (Ta)	Pump Vacuum ("Hg) (Pv)
		457	159.315											
1 1	5		161.48	.0009	.5113	.51	136	69	68	253	254	46		15
1 1	10			.0003	.1704	.17	144	68	68	253	254	45		6
1 2	15		163.99	Bias check			J	V	M					
1 2	20		164.93	.0002	.1136	.11	147	70	68	248	252	42		4
1 3	25		165.99	.0002	.116	.11	147	71	69	248	254	42		4
1 3	30		167.23	.0004	.2273	.23	147	73	69	248	253	42		6
1 4	35		168.60	.0004	.2273	.23	148	73	69	248	253	43		6
1 4	40		169.76	.0003	.1704	.17	147	74	70	248	254	43		5
1 5	45		170.95	.0003	.1704	.17	147	75	71	248	253	44		5
1 5	50		172.15	.0003	.1704	.17	147	76	72	248	254	46		5
1 6	55		173.34	.0004	.2273	.23	148	76	72	249	254	47		5
1 6	60		174.55	.0003	.1704	.17	147	77	73	248	253	46		5
1 1	65		175.68	.0003	.1704	.17	147	77	73	248	251	47		5
1 1	70		176.66	.0002	.11	.11	147	78	74	248	253	47		4
1 2	75		178.98	.0004	.2273	.23	148	77	74	249	253	48		5
1 2	80		179.51	.0005	.2841	.28	148	78	74	250	255	51		6
1 3	85		181.07	.0005	.2841	.28	148	79	75	248	253	53		6
1 3	90		182.60	.0005	.28	.28	148	79	75	248	255	53		6
1 4	95		184.13	.0004	.23	.23	148	80	76	249	253	55		5
1 4	100		185.69	.0005	.28	.28	148	80	76	248	254	57		6
1 5	105		187.55	.0006	.3409	.34	148	80	76	247	253	60		7
1 5	110		188.68	.0003	.1704	.17	148	80	76	248	254	60		4
1 6	115		189.88	.0003	.1704	.17	148	80	76	247	254	60		4
1 6	120	657	191.29c	.0004	.23	.23	149	81	77	247	253	58		4
1														

South Port

Notes:

Field Data Sheet

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Date 12/15/98
Test Method ODEQ 7
Concurrent Testing
Run # 8
Operator Support
Temperature, Amb (Ta)
Pressure, Bar (Pb)
Pressure, Static (Pstat)
Filters

Client/Plant/Location: OSU East

Probe Cp Heat Set
Pilot Pretest in In/m
Leak Check Post 3 in 0.0 In/m
Nozzle
Sample Box Heat Set
Meter Box dH@ Y
Meter Pretest cfm In H
Leak Check Post 0.010 cfm 16 In H
Moisture Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head (inH2O) (ΔPs)	Orifice Pressure (inH2O) DP Std'd	Orifice Pressure (inH2O) Actual (ΔH)	STACK °F (Ts) Amb:	METER Inlet/Act °F (Tm in) Amb:	METER Outlet °F (Tm out) Amb:	PROBE °F (Tp) Amb:	OVEN/Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		700	191.290											
1 1	5		192.64	.0004	.23	.23	148	80	78	250	250	53		5
1 1	10		— . —	.0002	.11	.11	148	81	78	248	252	60		3
1 2	15		194.63	.0002	.11	.11	148	81	78	249	252	60		3
1 2	20		195.62	.0002	.11	.11	148	81	79	247	253	56		3
1 3	25		196.61	.0002	.11	.11	149	81	78	249	253	52		3
1 3	30		197.61	.0002	.11	.11	149	79	76	249	252	50		3
1 4	35		198.60	.0002	.11	.11	147	79	77	248	254	51		3
1 4	40		199.98	.0004	.2273	.23	148	79	77	249	253	52		5
1 5	45		200.87	.0002	.11	.11	148	79	77	249	253	52		3
1 5	50		— . —	.0002	.11	.11	148	79	77	249	254	52		3
1 6	55	755	202.630	.0002	.11	.11	148	79	77	249	253	52		3
1 6	60													

Notes:

Field Data Sheet

Horizon Engineering

Date	12-15-98
Test Method	7
Concurrent Testing	25A
Run #	9 West cyc 1
Operator	DRB Support
Temperature, Amb (Ta)	35
Pressure, Bar (Pb)	30.9
Pressure, Static (Pstat)	0
Filters	78-283 985-51

Client/Plant/Location:	OSU / West / Cycl
Probe	5-2 Cp .80 Heat Set 250
Pitot Leak Check	Pretest in in/h; Post in in/h
Nozzle	.988
Sample Box	3 Heat Set 250
Meter Box	7 dH@ 1.75 Y .97
Meter Leak Check	Pretest cfm in; Post cfm in
Moisture	19 Tdb Twb

Stack Diagram

Cyclonic Flow ?

	Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head in H2O (ΔPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure in H2O ACTUAL (ΔH)	STACK °F (Ts)	METER Inlet/Avg °F (Tm in)	METER Outlet °F (Tm out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Ta)	Pump Vac in Hg
			758am	553.170											
1	6	5		554.621	.0002	.11	.11	145	65	65	270	258	52		5
2	6	10		.	.0002		.11	146	65	65	270	259	50		5
3	5	15		556.625	.0003	.167	.17								
4	5	20		557.93	.0003	.167	.17	149	65	65	270	250	50		6
5	4	25		559.17	.0003		.17	149	63	64	270	255	50		6
6	4	30		.	.0003		.17	149	63	64	270	255	50		6
7	3	35		.											
8	3	40		.	.0006	.335	.34	150	64	63	272	256	52		6
9	2	45		564.400	.0004	.22	.34	149	64	63	275	254	52		6
10	2	50		565.749	.0004		.22	149	64	63	270	253	53		6
11	1	55		567.41	.0008	.447	.45	150	64	63	263	253	53		6½
12	1	60		569.42	.0008		.45	143	65	63	262	255	52		6½
13	1	65		571.13	.0007	.39	.39	144	65	63	263	255	53		5½
14	1	70		.	.0008	.45	.45	143	66	63	263	253	52		6
15	2	75		575.021	.00068		.45	143	66	63	265	253	52		6
16	2	80		577.175	.0008		.45	144	66	63	262	255	52		6
17	3	85		578.42	.0003		.17	150	66	63	261	252	52		4
18	3	90		580.	.0005		.30	150	66	63	264	253	49		5
19	4	95		581.65	.0005		.30	150	66	63	263	252	48		5
20	4	100		582.62	.0002		.11	150	66	63	264	252	46		3
21	5	105		583.61	.0002		.11	149	66	63	264	252	46		3
22	5	110		585.85	.0010	.561	.56	150	66	63	263	253	46		6
23	6	115		588.52	.0010		.56	150	66	64	263	252	47		6
24	6	120	958	589.905	.0010		.56	150	66	64	262	252	47		6
25				.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU / west / cyc 1

Date 12-15-98

Test Method 7

Concurrent Testing 25A

Run # 9 con't west cyc 1

Operator RB Support

Temperature, Am (Ta) 37

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Probe 3-2 Cp Heat Set 250 °F

Pitot	Pretest	in		in/min
Leak Check	Post	3½ in	0.0	in/min

Nozzle 988

Sample Box 3 Heat Set °F

Meter Box 7 dH@ 1.76 Y .99

Meter	Pretest	cfm		inHg
Leak Check	Post 0.005	cfm	11	inHg

Filters Cyclonic Flow? Stack Diagram Moisture 1.9 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	AFTER Inlet/Avg °F (Tm-In) Amb:	METER Outlet °F (Tm out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1003	589.905											
1 1	5		591.090	.0003	.169	.17	149	68	65	262	253	50		3
1	10		592.22	.0003		.17	149	68	65	263	252	48		3
2	15		593.38	.0003		.17	150	67	65	266	253	47		3½
1 2	20		594.600	.0003		.17	150	67	65	265	254	49		3½
3	25		595.72	.0003		.17	151	67	65	264	253	49		3½
6 3	30	1033	596.83	.0002		.11	150	67	65	264	252	49		3
7 4	35		597.73	.0002		.11	150	66	65	264	253	49		3
8 4	40		598.785	.0002		.11	150	66	65	264	252	47		3
9 5	45	1048	600.40	.0005	.28	.28	151	66	65	263	252	47		4
10 5	50	1053	602.152	.0007	.387	.39	151	66	65	262	251	46		5
11														
12														
13														
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25														

Notes:

Field Data Sheet

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Date 12-15-98

Test Method 7

Concurrent Testing 25A

Run # 10 East cyc 1

Operator DRB Support —

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-250 98S-52

Client/Plant/Location : OSU / East / Cyc 1

Probe 3-1 Cp .79 Heat Set 250

Pilot Pretest in in/min

Leak Check: Post in in/min

Nozzle .788

Sample Box 2 Heat Set 250

Meter Box 4 dH@ 1.77 Y .99

Meter Pretest 0.006 cfm 15 inH

Leak Check: Post cfm inH

Stack Diagram

Cyclonic Flow ?

Moisture (8 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Orifice Pressure Setting (dH)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Avg:	METER Inlet/Avg °F (Tm in) Avg:	METER Outlet °F (Tm out) Avg:	PROBE °F (Tp) Avg:	OVEN After °F (To) Avg:	IMPINGER Outlet °F (Ti) Avg:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		1058	202.813											
South 1 6	5			.0003	.167	.17	143	61	61	247	253	44		8
2 6	10		Cal SUM											
3 5	15		206.225	.0005		.30	146	62	61	249	254	45		13
4 5	20		207.90	.0005		.30	146	62	61	249	254	45		13
5 4	25		209.51	.0006	.338	.34	146	63	61	248	253	44		12½
6 4	30		—	.0004	.238	.24	146	65	64	248	255	44		10
7 3	35		212.42	.0004		.24	147	69	65	248	255	44		10
8 3	40		214.000	.0005		.30	147	69	65	248	255	44		11
9 2	45		215.82	.0006		.34	148	72	66	248	252	43		12
10 2	50		216.695	.0002		.11	144	72	67	248	254	46		5
11 1	55		217.815	.0003		.17	141	73	68	248	254	46		6
12 1	60		218.97	.0003		.17	142	74	69	249	254	46		6
13 1	65	1158	220.18	.0003		.17	142	75	70	247	255	45		6
14 1	70		221.35	.0003		.17	140	76	71	248	253	44		6
15 2	75		222.49	.0003		.17	141	78	72	248	255	44		6
16 2	80		223.55	.0002	.114	.11	143	79	74	249	254	46		4
17 3	85		224.51	.0002		.11	145	79	75	247	254	47		4
18 3	90		225.29	.0002		.11	148	80	75	247	253	46		4
19 4	95		226.45	.0002		.11	148	80	75	246	252	46		4
20 4	100		227.81	.0004	.228	.27	148	81	77	248	253	45		5
21 5	105		229.05	.0004		.23	148	82	77	248	254	45		5
22 5	110		230.64	.0004		.23	148	83	78	247	255	46		5
23 6	115		232.34	.0006	.338	.34	149	83	79	247	252	46		6
24 6	120	1258	234.072	.0006		.34	149	83	79	247	254	46		6
25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU / East / Cyc 1

Date 12-15-98

Test Method 7

Concurrent Testing 25A

Run # 10 cont East Cyc 1

Operator DRB Support

Temperature, Am (Ta) 45

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-250 98S-52

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post 3½ in 0 in/min

Nozzle .189

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ 1.77 Y .99

Meter Pretest cfm inHg

Leak Check Post 0.013 cfm 14 inHg

Stack Diagram

Cyclonic Flow?

Moisture 18 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm-In) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1302	234.072											
1 6	5		235.4	.0003	.17	.17	148	85	82	249	253	49		4
2 6	10		.	.0002	.11	.11	148	85	82	249	254	50		4
3 5	15		.											
4 5	20		238.025	.0002		.11	151	88	85	248	254	52		4
5 4	25		338.99	.0002		.11	151	88	85	248	254	53		4
6 4	30	1332	240.14	.0002		.11	151	88	85	249	254	53		4
7 3	35		241.25	.0003		.17	151	88	85	248	254	52		3
8 3	40		242.	.0004	229	.23	151	88	85	249	254	51		4
9 2	45		243.	.0004		.23	151	89	86	248	254	51		4
10 2	50	1352	245.212	.0004		.23	151	88	87	248	253	51		4
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Notes:

Field Data Sheet

Horizon Engineering

Date	12-15-98
Test Method	7
Concurrent Testing	25A
Run #	11 West Cycl
Operator	OG.D Support
Temperature, Am (Ta)	58
Pressure, Bar (Pb)	30.9
Pressure, Static (Pstat)	0
Filters	98M-238 98S-51

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location :	OSU West/Cycl
Probe	3-2 Cp .80 Heat Set 255
Pitot Leak Check	Pretest 3.0 in 0.0 in/m; Post in in/m
Nozzle	.988
Sample Box	3 Heat Set 250
Meter Box	7 dH@ 1.757 Y .977
Meter Leak Check	Pretest 0.003 cfm 13.0 in Hg; Post cfm in Hg
Moisture	18 Tdb Twb

Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (ΔP's)	Orifice Pressure in H2O Desired	Orifice Pressure in H2O Actual (ΔH)	Stack °F (Ts)	Meter Inlet/Avg °F (Tm In)	Meter Outlet °F (Tm out)	Probe °F (Tp)	Oven Filter °F (To)	Impinger Outlet °F (Ti)	Aux °F (Tx)	Pump Vacuum in Hg (Pv)
		1357	602.397											
1 6	5			.0003		.17	146	72	72	266	253	59		4½
2 6	10					.17								
3 5	15		Cal Sum			.17								
4 5	20					.17								
5 4	25		609.25	.0002		.11	149	73	72	262	257	54		4
6 4	30		609.	.0002		.11	149	73	72	264	257	54		4
7 3	35		610.23	.0002		.11	149	74	73	266	253	53		4
8 3	40		611.25	.0002		.11	149	74	73	267	253	53		4
9 2	45		612.	.0002		.11	149	74	73	266	253	53		4
10 2	50		613.24	.0002		.11	150	74	73	266	254	53		4
11 1	55		614.38	.0003	.171	.17	148	74	73	266	254	54		4
12 1	60	1457	615.5	.0003		.17	147	74	73	266	254	54		4
13 1	65		617.00	.0003		.17	147	75	74	265	252	57		4
14 1	70		618.2	.0003		.17	147	75	74	265	252	57		4
15 2	75		619.47	.0003		.17	147	75	74	266	254	54		4
16 2	80		620.73	.0003		.17	147	75	74	266	254	54		4
17 3	85		622.03	.0003		.17	146	75	74	269	252	52		4
18 3	90		623.32	.0003		.17	147	75	74	266	254	54		4
19 4	95		624.75	.0002		.11	150	75	74	266	255	55		3
20 4	100		626.58	.0008	.455	.46	150	75	74	267	254	55		5
21 5	105			.0008		.46	151	75	74	264	254	55		5
22 5	110		632.78											
23 6	115	1553	635.09	.0011	.63	.63	153	75	72	264	255	57		5.0
24 6	120	1558	637.25	.0010	.57	.57	153	75	72	264	254	59		4.5
25														

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Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU West Cycle 1

Date 12-15-98

Test Method 7

Concurrent Testing 25A

Run # 11 West Cycle 1

Operator JDF Support

Temperature, Am (Ta) 50

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-238, 98S-51

Stack Diagram

Cyclonic Flow? NO

Probe 3-2 Cp .80 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ 1.757 Y .977

Meter Pretest cfm inHg

Leak Check Post .003 cfm 7 inHg

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1 6	125	1603	639.33	.0009	.51	.51	153	75	72	263	252	60		4.5
2 6	130	1608	642.17	.0016	.91	.91	153	75	72	259	254	62		6.0
3 5	135	1613	~~644.44~~	.0012	.68	.68	153	75	71	263	254	66		5.0
4 5	140	1618	644.44	.0004	.23	.23	152	74	71	262	252	60		3.5
5 4	145	1623	645.79	.0004	.23	.23	152	74	71	262	252	60		3.5
6 4	150	1628	647.14	.0004	.23	.23	152	72	71	264	254	55		3.5
7 3	155	1633	648.24	.0002	.11	.11	152	72	70	264	253	53		3.0
8 3	160	1638	649.87	.0005	.29	.29	151	71	69	264	255	51		3.5
9 2	165	1643	651.56	.0005	.29	.29	151	71	69	266	254	47		3.5
10 2	170	1648	653.66	.0009	.51	.51	150	71	69	260	254	45		4.5
11 1	175	1653	655.643	.0008	.46	.46	149	72	69	259	255	45		4.5
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Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/R12/East/Cycle 1

Date 12-15-98

Test Method ODEQ 7

Concurrent Testing EPA 25A

Run # 12 Ecs 4

Operator SDF Support

Temperature, Am (Ta) 45

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-250, 98J-52

Probe 3-1 Cp Heat Set 250 °F

Pitot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter	Pretest 0.010	cfm	14	inHg
Leak Check	Post	cfm		inHg

Stack Diagram

Cyclonic Flow? NO

Moisture 18% Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	REFER Inlet-Avg °F (Tm in) Amb:	METER Outlet °F (Tm out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1657	245.447											
1	5	1702	248.02	.0013	.74	.74	134	66	66	250	251	45		5.0
1	10	1707	.	.0006	.34	.34	143	67	66	248	251	42		3.0
2	15	1712	. .	JUM			BIAS	—			—	—		
2	20	1717	252.83											
3	25	1722	254.73	.0008	.46	.46	146	71	67	246	253	46		4.0
3	30	1727	256.42	.0006	.34	.34	146	73	68	245	253	46		3.5
4	35	1732	258.09	.0006	.34	.34	146	74	69	235	252	47		3.5
4	40	1737	260.03	.0008	.46	.46	146	75	70	241	253	48		4.0
5	45	1742	261.98	.0008	.46	.46	146	77	71	238	253	51		4.0
5	50	1747	263.93	.0008	.46	.46	146	77	72	245	251	53		4.0
6	55	1752	265.81	.0008	.46	.46	146	79	73	248	250	55		4.0
6	60	1557	266.65	.0002	.11	.11	147	80	73	244	251	54		2.0
6	65	1802	267.63	.0002	.11	.11	147	78	74	245	250	51		2.0
6	70	1807	268.77	.0003	.17	.17	147	79	74	249	252	52		2.5
5	75	1812	269.92	.0003	.17	.17	147	78	74	249	251	56		2.5
5	80	1817	271.06	.0003	.17	.17	148	78	74	249	251	54		2.5
4	85	1822	272.18	.0003	.17	.17	147	78	75	249	250	54		2.5
4	90	1827	273.26	.0002	.11	.11	147	78	75	249	252	54		2.0
3	95	1832	274.81	.0005	.29	.29	140	78	75	249	251	55		3.0
3	100	1837	276.31	.0005	.29	.29	139	79	75	249	250	57		3.0
2	105	1842	277.50	.0003	.17	.17	138	80	76	256	249	58		2.5
2	110	1847	279.08	.0005	.29	.29	139	80	76	249	251	59		3.0
1	115	1852	280.81	.0006	.34	.34	139	80	76	249	251	62		3.5
1	120	1857	282.77	.0008	.46	.46	138	80	76	244	254	63		4.0
			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : 6050/R12/East/Cycle1

Date 12-15-98

Test Method OOEQ 7

Concurrent Testing EPA 25A

Run # 12

Operator SDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-280, 585-52

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box #7 dH@ Y

Meter Pretest cfm inHg

Leak Check Post .005 cfm 9 inHg

Stack Diagram

Cyclonic Flow ? NO

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1	6	125	1902	283.93	.0003	.17	.17	142	81	77	249	252	66		3.0
2	6	130	1907	285.27	.0004	.23	.23	141	81	78	250	253	67		3.0
3	5	135	1912	286.60	.0004	.23	.23	147	81	78	248	250	56		3.0
4	5	140	1917	287.97	.0004	.23	.23	148	81	78	248	250	53		3.0
5	4	145	1922	289.46	.0005	.29	.29	148	81	77	248	249	51		3.5
6	4	150	1927	290.40	.0002	.11	.11	148	81	77	247	249	51		2.5
7	3	155	1932	291.39	.0002	.11	.11	148	80	77	248	250	49		2.5
8	3	160	1937	292.90	.0005	.29	.29	136	80	77	248	249	51		3.5
9	2	165	1942	294.22	.0004	.23	.23	131	81	77	247	248	52		3.0
10	2	170	1947	295.56	.0004	.23	.23	130	81	78	247	252	52		3.0
11	1	175	1952	296.892	.0004	.23	.23	121	80	77	248	250	53		3.0
12			.												
13			.												
14			.												
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24			.												
25			.												

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU/Cycle 1/R13/West

Date 12-15-98

Test Method ODEQ 7

Concurrent Testing EPA 25A

Run # 13

Operator JDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-283, 983-51

Probe 3-2 Cp .80 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ 1.757 Y .977

Meter Pretest .007 cfm 8 inHg

Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow? NO

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1956	655.784											
1 1	5	2001	.	.0031	1.77	1.75	139	63	64	266	244	45		6.0
2 1	10	2006	.	SUM		BIAS								
3 2	15	2011	666.37											
4 2	20	2016	667.92	.0005	.29	.29	148	64	63	263	254	52		3.0
5 3	25	2021	669.61	.0006	.34	.34	147	65	63	264	254	51		3.0
6 3	30	2026	670.64	.0002	.11	.11	147	65	64	260	255	52		2.5
7 4	35	2031	672.09	.0004	.23	.23	147	66	64	266	255	51		3.0
8 4	40	2036	673.57	.0004	.23	.23	149	66	64	267	255	52		3.0
9 5	45	2041	675.23	.0005	.29	.29	148	66	65	267	255	52		3.5
10 5	50	2046	676.45	.0003	.17	.17	147	67	65	258	252	52		2.5
11 6	55	2051	677.66	.0003	.17	.17	148	68	65	267	255	54		2.5
12 6	60	2056	678.67	.0002	.11	.11	149	68	65	265	254	55		2.0
13 6	65	2101	679.90	.0003	.17	.17	149	68	66	266	255	54		2.5
14 6	70	2106	681.31	.0004	.23	.23	149	68	66	264	252	52		3.0
15 5	75	2111	683.22	.0007	.40	.40	149	68	66	265	254	54		3.5
16 5	80	2116	685.14	.0008	.46	.46	149	69	66	264	252	55		4.0
17 4	85	2121	687.15	.0008	.46	.46	149	69	66	263	253	58		4.0
18 4	90	2126	688.91	.0008	.46	.46	149	69	66	264	253	60		4.0
19 3	95	2131	689.74	.0002	.11	.11	150	69	66	264	254	61		2.0
20 3	100	2136	690.58	.0002	.11	.11	150	69	67	265	252	57		2.0
21 2	105	2141	691.78	.0003	.17	.17	146	69	67	265	252	58		2.5
22 2	110	2146	693.14	.0004	.23	.23	145	68	67	264	254	59		3.0
23 1	115	2151	694.56	.0004	.23	.23	146	68	66	264	253	60		3.0
24 1	120	2156	695.92	.0004	.23	.23	144	69	67	264	253	63		3.0
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU/cycle 1/R13/west

Date 12-15-98

Test Method ODEQ7

Concurrent Testing EPA 25A

Run # 13

Operator JDF Support

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 99M-283 SBS-51

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ Y

Meter Pretest cfm inHg

Leak Check Post .009 cfm 10 inHg

Moisture 18 Tdb NA Twb NA

Stack Diagram

Cyclonic Flow? No

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1 6	125	2201	697.25	.0004	.23	.23	149	69	67	253	255	63		3.0
2 6	130	2206	698.22	.0002	.11	.11	149	69	67	265	253	63		2.0
3 5	135	2211	699.18	.0002	.11	.11	149	69	67	266	255	61		2.0
4 5	140	2216	700.15	.0002	.11	.11	149	68	67	266	255	60		2.0
5 4	145	2221	701.45	.0004	.23	.23	137	68	67	266	255	61		4.5
6 4	150	2226	702.81	.0004	.23	.23	137	68	67	264	253	63		5.0
7 3	155	2231	704.03	.0003	.17	.17	137	69	67	264	254	62		5.0
8 3	160	2236	705.26	.0003	.17	.17	138	69	67	267	254	62		5.0
9 2	165	2241	706.65	.0004	.23	.23	137	68	67	266	254	63		6.0
10 2	170	2246	707.89	.0003	.17	.17	133	69	67	264	254	65		5.0
11 1	175	2251	709.065	.0003	.17	.17	140	69	67	264	252	63		5.0
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Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU/R14/East/cycle 1

Date 12-15-98

Test Method ODEQ 7

Concurrent Testing EPA 25A

Run # 14

Operator JDF Support CDB

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.9

Pressure, Static (Pstat) 0

Filters 98M-250, 98S-52

Cyclonic Flow ?

Stack Diagram

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle 98E

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest 007 cfm 9 inHg

Leak Check Post .005 cfm 15 inHg

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		2258	297.062				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	5	2303	.	.0010	.57	.57	114	67	67	248	248	49		11.0
1	10	2308	.	JUMP			BIAS							
2	15	2313	304.08											
2	20	2318	305.71	.0007	.40	.40	139	68	65	247	250	54		7.5
3	25	2323	307.72	.0009	.51	.51	132	69	65	247	250	56		8.5
3	30	2328	308.66	.0002	.11	.11	147	70	66	245	251	57		3.5
4	35	2333	309.56	.0002	.11	.11	147	70	67	248	252	55		3.5
4	40	2338	310.46	.0002	.11	.11	147	70	67	249	250	54		3.5
5	45	2343	311.39	.0002	.11	.11	147	71	68	248	251	52		3.5
5	50	2348	312.56	.0003	.17	.17	147	71	68	248	251	52		4.5
6	55	2353	313.87	.0004	.23	.23	148	73	69	248	251	55		5.5
6	60	2358	315.17	.0004	.23	.23	147	73	69	248	253	59		5
6	65	2403	316.38	.0003	.17	.17	148	74	70	249	252	59		5
6	70	2408	317.57	.0003	.17	.17	147	74	70	248	252	59		5
5	75	2413	318.76	.0003	.17	.17	148	74	71	248	253	61		5
5	80	2418	319.94	.0003	.17	.17	148	75	71	249	252	61		5
4	85	2423	320.97	.0002	.11	.11	148	75	71	249	253	62		4
4	90	2428	322.17	.0003	.17	.17	148	75	71	248	253	58		5
3	95	2433	323.54	.0004	.23	.23	148	75	72	249	253	60		6
3	100	2438	324.91	.0004	.23	.23	147	75	72	248	253	60		6
2	105	2443	326.15	.0003	.17	.17	147	75	72	248	252	62		6
2	110	2448	327.36	.0003	.17	.17	148	75	72	248	252	62		6
1	115	2453	— . —	.0003	.17	.17	148	75	72	248	253	63		6
1	120	2458	329.929	.0004	.23	.23	148	75	72	248	254	62		6
			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU/R14/East/Cyclone

Date 12-16-98

Test Method OOEQ 7

Concurrent Testing EPA 25A

Run # 14

Operator CDM Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb)

Pressure, Static (Pstat) 0

Filters 98M-~~283~~ 250, 985-52

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest cfm inHg

Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow? No

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
	.	101	329.929											
1 1	5		330.83	.0002	.11	.11	140	74	72	249	252	58		8
2 1	10		331.73	.0002	.11	.11	145	74	72	249	253	60		8
3 2	15		332.65	.0003	.17	.17	147	73	71	249	252	59		8
4 2	20		333.55	.0003	.17	.17	146	74	71	249	252	59		8
5 3	25		335.69	.0010	.5703	.57	144	74	71	248	252	59		11
6 3	30		337.92	.0010	.5703	.57	147	76	73	248	252	68		11
7 4	35		339.11	.0003	.17	.17	148	77	73	247	253	61		5
8 4	40		340.22	.0003	.17	.17	148	76	74	248	252	48		5
9 5	45		341.00	.0001	.06	.06	148	75	73	248	251	48		4
10 5	50	151	341.907	.0002	.11	.11	148	75	73	249	253	44		5
11 6	55		.											
12 6	60		.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU, West, Cycle 1, R15

Date 12-16-98

Test Method OEQ 7

Concurrent Testing EPA 25A

Run # 15

Operator COB Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb)

Pressure, Static (Pstat) 0

Filters 98M- 99S-

Stack Diagram

Cyclonic Flow ? NO

Probe 3-2 Cp Heat Set 250 °F

Pilot Pretest 4 in 0 in/min

Leak Check Post in in/min

Nozzle .955

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ Y

Meter Pretest .003 cfm 10 inHg

Leak Check Post cfm inHg

Moisture 15 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		159	709.140											
1 1	5		711.77	.0009	.5183	.51	137	60	60	292	253	38		13
2 1	10		.	.0003	.1711	.17	148	59	60	289	254	38		4
3 2	15		714.18		Bias	Check		J	VM					
4 2	20		715.37	.0003	.17	.17	149	60	60	289	255	39		4
5 3	25		716.57	.0003	.17	.17	149	60	60	290	254	39		4
6 3	30		717.65	.0002	.11	.11	149	60	60	287	254	39		3
7 4	35		719.19	.0005	.2852	.29	149	61	60	290	256	39		5
8 4	40		721.05	.0007	.3992	.40	149	61	60	287	254	39		6
9 5	45		722.23	.0003	.17	.17	150	62	60	288	255	41		4
10 5	50		723.78	.0005	.29	.29	150	63	61	289	254	43		5
11 6	55		725.39	.0005	.29	.29	150	63	61	289	254	43		5
12 6	60		727.15	.0006	.34	.34	150	64	61	288	253	43		5
13 1	65		728.56	.0004	.2281	.23	150	64	61	287	254	42		4
14 1	70		730.30	.0005	.29	.29	150	65	61	288	255	43		5
15 2	75		731.91	.0004	.2281	.23	151	65	61	288	254	43		5
16 2	80		733.66	.0006	.34	.34	151	65	62	287	254	45		5
17 3	85		735.38	.0006	.34	.34	152	65	63	288	254	45		5
18 3	90		737.10	.0006	.34	.34	152	66	62	287	254	47		5
19 4	95		738.84	.0006	.34	.34	152	66	63	286	253	47		5
20 4	100		740.53	.0006	.34	.34	153	66	63	287	252	49		5
21 5	105		742.31	.0005	.29	.29	152	66	63	288	254	52		5
22 5	110		743.94	.0006	.34	.34	152	66	63	286	254	55		5
23 6	115		745.15	.0003	.17	.17	152	66	63	288	255	55		4
24 6	120	359	746.753	.0004	.23	.23	152	66	63	288	255	57		5
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU West Cycle 1

Date 12/16/98

Test Method ODEQ 7

Concurrent Testing

Run # 15

Operator CDB Support

Temperature, Am (Ta) 4C

Pressure, Bar (Pb)

Pressure, Static (Pstat) 0

Probe 3-2 Cp — Heat Set 250 °F

Pitot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle 998

Sample Box — Heat Set 250 °F

Meter Box dH@ — Y

Meter	Pretest	cfm	inHg
Leak Check	Post .004 cfm	13	inHg

Stack Diagram

Filters — Cyclonic Flow ? — Moisture — Tdb — Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		402	746.753											
1 1	5		748.60	.0007	.4C	.4°	149	66	63	289	253	53		6
2 1	10		750.43	.0007	.4C	.4C	15C	66	63	285	254	56		6
3 2	15		752.98	.0014	.8°	.8C	149	66	64	287	251	56		8
4 2	20		755.56	.0014	.8C	.8C	149	67	64	286	254	60		8
5 3	25		758.08	.0015	.86	.86	15C	68	64	286	255	62		8
6 3	30		760.54	.0013	.74	.74	152	69	64	287	255	63		9
7 4	35		762.90	.0013	.74	.74	152	69	64	287	255	63		9
8 4	40		765.57	.0015	.86	.86	152	69	65	287	254	67		11
9 5	45		768.26	.0013	.74	.74	153	69	65	285	253	68		11
10 5	50	452	770.848	.0014	.8C	.8°	152	70	65	286	254	67		11
11 6	55		.											
12 6	60		.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cycle 1

Date 12/16/98

Test Method 7

Concurrent Testing

Run # 16

Operator C D/B Support

Temperature, Amb (Ta) 35

Pressure, Bar (Pb)

Pressure, Static (Pstat) 0

Probe Cp — Heat Set 250 °F

Pitot — Pretest 4 in 0 in/min

Leak Check — Post in in/min

Nozzle .988

Sample Box — Heat Set 250 °F

Meter Box — dH@ 1.76899 — Y .98968

Meter — Pretest 0.01 cfm 15. inHg

Leak Check — Post cfm inHg

Stack Diagram

Filters — Cyclonic Flow? — Moisture — Tdb — Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		459	342.004				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5		343.35	.0004	.2281	.23	129	63	62	259	262	37		8
2 1	10		.	.0005	.29	.29	141	63	62	258	262	38		8
3 2	15		346.07		JUM Bias									
4 2	20		347.42	.0003	.17	.17	147	64	62	257	263	37		8
5 3	25		348.78	.0004	.23	.23	146	65	62	257	264	37		8
6 3	30		350.13	.0004	.23	.23	147	66	63	257	263	37		8
South 7 4	35		— . —	.0003	.17	.17	146	67	63	256	263	36		7
8 4	40		352.50	.0003	.17	.17	146	68	64	257	264	37		7
9 5	45		353.67	.0003	.17	.17	146	69	65	257	262	36		7
10 5	50		354.85	.0003	.17	.17	146	69	66	256	263	36		7
11 6	55		356.03	.0003	.17	.17	147	71	66	257	263	36		7
12 6	60		357.39	.0004	.23	.23	146	71	67	256	263	36		8
13 1	65		358.59	.0003	.17	.17	147	72	67	257	263	37		7
14 1	70		359.80	.0003	.17	.17	147	73	68	257	263	38		7
15 2	75		— . —	.0002	.11	.11	147	73	69	258	263	39		6
16 2	80		361.82	.0002	.11	.11	147	73	69	257	263	39		6
17 3	85		363.01	.0003	.17	.17	147	74	70	256	263	38		7
18 3	90		364.02	.0002	.11	.11	148	75	71	256	262	40		6
19 4	95		365.03	.0002	.11	.11	148	75	71	257	262	39		6
20 4	100		366.03	.0002	.11	.11	149	76	72	257	263	40		6
21 5	105		367.22	.0003	.17	.17	149	76	72	256	263	40		7
22 5	110		368.23	.0002	.11	.11	146	77	73	256	263	40		6
23 6	115		369.22	.0002	.11	.11	145	77	73	257	263	40		6
24 6	120	659	370.224	.0002	.11	.11	145	78	74	256	260	40		
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cyclone

Date	12/16/93	Probe	Cp	Heat Set °F
Test Method	7	Pitot	Pretest in	in/min
Concurrent Testing	25A	Leak Check	Post in	in/min
Run #	16	Nozzle		
Operator	CDS Support	Sample Box		Heat Set °F
Temperature, Am (Ta)	35	Meter Box	dH@	Y
Pressure, Bar (Pb)		Meter	Pretest cfm	inHg
Pressure, Static (Pstat)	0	Leak Check	Post 0.016 cfm 14	inHg

Stack Diagram

Filters

Cyclonic Flow?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		702	370.224											
1 1	5		371.19	.0002	.11	.11	148	78	75	258	263	43		7
2 1	10		372.76	.0004	.23	.23	148	78	75	258	263	44		11
3 2	15		374.01	.0003	.17	.17	147	79	76	257	263	48		8
4 2	20		375.20	.0003	.17	.17	148	79	76	258	263	47		8
5 3	25		376.53	.0004	.23	.23	147	79	76	258	263	48		8
6 3	30		378.12	.0005	.29	.29	147	80	76	257	262	47		10
7 4	35		379.35	.0003	.17	.17	147	81	76	257	262	49		8
8 4	40		380.55	.0003	.17	.17	148	80	77	257	263	53		8
9 5	45		381.72	.0003	.17	.17	150	81	77	257	263	54		8
10 5	50		382.91	.0003	.17	.17	150	81	77	258	263	54		8
11 6	55	757	384.104	.0003	.17	.17	150	81	78	258	263	54		8
12 ~~6~~	~~60~~													
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU West Cyclo 1

Date 12/16/98
Test Method 7
Concurrent Testing 25A
Run # 17 west
Operator DRB Support
Temperature, Am (Ta) 33
Pressure, Bar (Pb) 30.6
Pressure, Static (Pstat) 0
Filters 98M 283 185-51

Probe S-L Cp Heat Set 250 °F
Pilot Pretest in in/min
Leak Check Post in in/min
Nozzle 988
Sample Box 3 Heat Set 250 °F
Meter Box 7 dH@ Y
Meter Pretest .003 cfm 16 inHg
Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow?

Moisture ~~18~~ 23 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		817	771.119				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	5		772.62	.0004	.22	.22	141	66	73	288	284	55		6
1	10		773.721	.0002	.115	.12	134	65	65	285	252	52		5
2	15		774.52	.0002		.12	149	65	65	280	252	49		5
2	20		775.31	.0002		.12	150	65	64	280	252	50		5
3	25		776.000	.0002		.12	150	65	64	280	252	51		5
3	30		777.70	.0010	.557	.56	153	65	64	280	252	52		12
4	35		780.12	.0015	.853	.75	153	65	64	275	252	60		13
4	40		782.55	.0015		.75	153	65	64	274	250	53		13
5	45		784.999	.0015		.75	153	65	63	274	251	46		13
5	50		787.61	.0015		.75	153	65	63	274	251	42		13
6	55		789.82	.0015		.75	153	65	63	275	255	44		13
6	60		792.37	.0015		.75	153	65	63	275	254	44		13
6	65		794.86	.0015		.75	153	65	63	275	253	44		13
6	70		796.	.0015		.75	153	65	62	275	254	44		13
5	75		799.69	.0013	.653	.65	153	66	62	276	252	47		12
5	80		801.99	.0013		.65	153	66	62	276	255	45		12
4	85		804.29	.0013		.65	153	66	62	275	253	46		12
4	90		806.	.0013		.65	154	66	62	275	254	46		12
3	95		807.17	.0003	.153	.15	154	66	62	275	253	46		8
3	100		808.342	.0003		.15	153	65	62	277	253	43		8
2	105		810.32	.0007	.351	.35	152	65	62	269	254	44		13
2	110		811.91	.0007		.35	153	65	62	269	254	45		13
1	115		813.65	.0007		.35	153	65	62	269	254	45		13
1	120	1017	815.389	.0001		.35	153	65	62	270	254	45		13

Notes: 7:59am → 8:17am Hot check wood % H_2O (Kiln off)

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU / west / cell 1

Date 12-16

Test Method 7

Concurrent Testing 25A

Run # 17 cont west Cell 1

Operator DRB Support

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M 283 98S-51

Stack Diagram

Cyclonic Flow?

Probe 3-2 Cp .8 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in 0.0 in/min

Nozzle .988

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ 1.76 Y 1

Meter Pretest cfm inHg

Leak Check Post 0.010 cfm inHg

Moisture 26 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
	.	1022	815.389											
1 6	5		818.055	.0018	.904	.90	156	64	62	280	253	47		15
2 6	10		820.82	.0018		.90	156	64	62	276	253	48		15
3 5	15		822.89	.0011	.548	.55	159	64	62	276	253	49		12
4 5	20		824.74	.0009	.417	.42	160	65	61	276	253	47		10
5 4	25		826.65	.0009		.42	160	65	62	276	253	47		11
6 4	30	1052	827.78	.0002	.099	.10	161	65	62	278	252	47		6
7 3	35		828.73	.0002		.10	161	65	62	278	252	47		7
8 3	40		829.93	.0004	.185	.19	157	65	62	276	253	47		10
9 2	45	1107	831.212	.0004		.19	151	65	63	278	254	49		10
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
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25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSW/East/cycl

Date 12-16-98

Test Method 7

Concurrent Testing 25A

Run # 18 East

Operator ORB Support

Temperature, Am (Ta) 38

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M-250 98S-52

Cyclonic Flow ?

Stack Diagram

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle 988

Sample Box 24 Heat Set °F

Meter Box 4 dH@ 1.768 Y .987

Meter Pretest 0.013 cfm 15 inHg

Leak Check Post cfm inHg

Moisture 23 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1116	384.419											
1 6	5			.0009		.14	150	58	59	257	263	51		10
2 6	10		Cal	JUN										
3 5	15		389.	.0005										
4 5	20		391.36	.0004	.184	.18	161	61	59	257	263	45		5
5 4	25		392.65	.0003	.232	.23	161	62	59	258	263	46		5½
6 4	30		394.0	.0005		.23	162	62	60	257	262	47		5½
7 3	35		395.21	.0006	.279	.28	162	62	60	257	262	47		7
8 3	40		396.72	.0006	.279	.28	162	62	60	257	262	47		7
9 2	45		397.93	.0004		.18	163	63	60	257	263	47		5
10 2	50		.	.0004		.18	163	64	61	257	263	45		5
11 1	55		.											
12 1	60	1216	401.42	.0005		.18	163	67	64	258	262	52		5
13 1	65		402	.0004		.18	163	67	64	258	262	52		5
14 1	70		403.821	.0003		.14	163	69	66	257	262	49		4
15 2	75		404.89	.0003		.14	163	69	66	257	262	47		4
16 2	80		405.72	.0003		.14	163	69	66	257	262	50		4
17 3	85		406.81	.0003		.14	163	71	68	240	263	51		5
18 3	90		407.99	.0003		.14	162	72	68	256	263	52		5
19 4	95		408.808	.0002	.099	.10	162	72	69	256	263	52		4
20 4	100		409.68	.0002		.10	161	72	68	257	263	52		4
21 5	105		410.23				162	73	70	256	263	53		4
22 5	110		411.42	.0003			163	73	70	256	263	53		4
23 6	115		412.38	.0002		.10	163	73	70	256	263	53		4
24 6	120	1316	413.075	.0005		.10	163	73						
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU/East/cyc 1

Date 12-16-98

Test Method 7

Concurrent Testing 25A

Run # B Cent East

Operator DRS Support —

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98m250 T85 52

Stack Diagram

Cyclonic Flow? ____

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post 3½ in 0 in/min

Nozzle .488'

Sample Box 2 Heat Set 250 °F

Meter Box 41 dH@ 1.768 Y .989

Meter Pretest cfm inHg

Leak Check Post 0.008 cfm 13 inHg

Moisture 25 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ts)	Pump Vacuum inHg (Pv)
		1319	413.075											
1	6	5	414.01	.0002		.10	163	71	71	258	263	46		4
2	6	10	414.92	.0003		.14	163	72	71	257	263	44		5
3	5	15	415.84	.0003		.14	163	72	71	257	263	45		5
4	5	20	416.79	.0002		.10	162	71	69	257	262	44		4
5	4	25	417.68	.0002		.10	163	71	69	258	263	45		4
6	4	30	418.54	.0002		.10	164	72	69	258	263	44		4
7	3	35	419.	.0004	.186	.19	144	69	71	258	263	45		4
8	3	40	420.95	.0003		.19	144	72	69	258	263	46		4
9	2	45	421.97	.0003		.14	144	72	69	258	263	49		4
10	2	50	423.209	.0004		.19	142	72	70	258	263	49		5
11														
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Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/West/cyc1

Date 12-16-98

Test Method 7

Concurrent Testing 25A

Run # 19 West

Operator DRD Support

Temperature, Am (Ta) 45

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M-238 98S-51

Stack Diagram

Cyclonic Flow?

Probe 3-2 Cp Heat Set 320 °F

Pitot Leak Check: Pretest in in/min; Post in in/min

Nozzle .988

Sample Box 3 Heat Set °F

Meter Box 7 dH@ Y

Meter Leak Check: Pretest 0.010 cfm 15. inHg; Post cfm inHg

Moisture 25 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1415	831.434											
1 6	5		Cal	.0016		.43	164	62	62	275	255	60		10
2 6	10			Sum										
3 5	15		837.39	.0019	.885	.89	164	62	62	278	254	60		16
4 5	20		840.13	.0019		.89	164	62	62	278	254	60		16
5 4	25		84 —	.0002		.10	165	63	62	277	254	58		4
6 4	30		84 —	.0002		.10	165	63	63	275	255	56		4
7 3	35		842.89	.0002		.10	165	63	63	275	255	55		4
8 3	40		843.900	.0002		.10	165	63	63	275	255	55		4
9 2	45		845.035	.0003	.1299	.13	165	64	63	205	255	57		7
10 2	50		846.	.0004	.172	.17	166	65	63	272	253	53		7
11 1	55		.	.0006	.251	.25	166	65	63	268	255	56		10
12 1	60	1515	849.	.0005	.21	.25	166	66	64	270	258	54		10
13 1	65		850.45	.0005	.21	.21	166	66	64	272	256	51		9
14 1	10		851.825	.0005		.21	165	66	64	270	254	48		9
15 2	78		853.63	.0009	.377	.38	165	66	64	270	255	48		13
16 2	80		855.92	.0009		.38	166	66	64	270	253	49		12
17 3	85		856.71	.0002		.10	165	66	65	274	254	48		6
18 3	90		857.53	.0001	0.04	.04	164	65	65	276	254	48		5
19 4	95		859.	.0001		.04	164	66	65	274	254	47		5
20 4	100		858.84	.0001		.04	165	66	65	275	254	47		5
21 5	105	1601	859.50	.0006	.25	.25	166	66	65	275	255	45		10.5
22 5	110	1606	860.91	.0008	.34	.34	166	66	65	272	254	44		12.0
23 6	115	1611	862.22	.0008	.34	.34	166	66	65	273	255	44		12.0
24 6	120	1616	863.91	.0004	.17	.17	167	66	65	273	254	46		8.0
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: O&U/West/Cyclone/K19

Date 12-16-98

Test Method ODEQ 7

Concurrent Testing EPA ESA

Run # 19 West

Operator SDF Support

Temperature, Am (Ta) 45

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M-283, 985-51

Stack Diagram

Cyclonic Flow?

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .998

Sample Box 3 Heat Set 250 °F

Meter Box 7 dH@ 1.75783 Y .97729

Meter Pretest cfm inHg

Leak Check Post .007 cfm 14 inHg

Moisture 25 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1	1	125	1622	865.25	.0005	.21	.21	167	66	65	274	254	46		8.5
2	1	130	1646	866.47	.0004	.17	.17	164	66	65	274	253	48		8.0
3	2	135	1651	867.74	.0004	.17	.17	138	64	64	273	251	50		8.0
4	2	140	11056	868.90	.0004	.17	.17	144	63	63	272	252	48		8.0
5	3	145	1701	870.07	.0004	.17	.17	160	63	63	272	252	41		8.0
6	3	150	1706	871.01	.0002	.10	.10	166	63	63	252	251	42		6.0
7	4	155	1711	872.67	.0008	.34	.34	1666	64	63	274	254	44		12.0
8	4	160	1716	874.02	.0005	.21	.21	166	65	63	266	254	53		9.0
9	5	165	1721	875.38	.0005	.21	.21	166	65	63	274	254	56		9.0
10	5	170	1726	876.97	.0007	.29	.29	1666	66	64	274	254	58		11.5
11	6	175	1731	878.486	.0006	.25	.25	166	67	64	272	253	60		10.0
12															
13															
14															
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24															
25															

Notes: * Kiln down for hot check

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSW / East / R20 / cycle 1

Date 12-16-98

Test Method OPE Q7

Concurrent Testing EPA 25A

Run # 20

Operator SDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M-250, 98S-52

Stack Diagram

Cyclonic Flow? NO

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest 0.011 cfm 14 inHg

Leak Check Post cfm inHg

Moisture 28 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
	.	1735	423.442											
1	5	1740	.	.0007	.29	.29	148	62	61	258	262	45		7.0
1	10	1745	.											
2	15	1750	.	JUMP	BIAS				+					
2	20	1755	.											
3	25	1800	.	RECAL										
3	30	1805	432.42											
4	35	1810	433.74	.0006	.25	.25	158	69	64	255	262	55		6.5
4	40	1815	434.69	.0003	.13	.13	159	73	68	255	262	53		4.5
5	45	1820	435.85	.0004	.17	.17	160	71	67	255	261	52		5.0
5	50	1825	437.10	.0005	.21	.21	160	73	68	255	261	56		5.5
6	55	1830	438.51	.0005	.21	.21	161	73	68	254	261	56		5.5
6	60	1835	439.29	.0003	.13	.13	162	74	69	255	261	58		4.5
6	65	1840	440.51	.0005	.21	.21	162	75	70	255	261	56		5.5
6	70	1845	441.62	.0004	.17	.17	163	77	72	255	261	60		5.0
5	75	1850	442.99	.0006	.25	.25	163	77	72	256	262	61		6.0
5	80	1855	444.22	.0005	.21	.21	163	79	73	255	262	64		6.0
4	85	1900	445.22	.0003	.13	.13	163	80	74	257	262	64		4.5
4	90	1905	446.37	.0004	.17	.17	163	81	75	256	261	61		5.0
3	95	1910	447.62	.0005	.21	.21	164	81	76	256	262	66		5.5
3	100	1915	448.50	.0002	.08	.08	162	83	77	256	262	58		4.0
2	105	1920	449.72	.0005	.22	.22	162	83	77	255	261	53		5.5
2	110	1925	450.62	.0002	.09	.09	162	84	79	253	261	53		4.0
1	115	1930	452.14	.0007	.31	.31	162	84	79	255	260	54		7.0
1	120	1935	452.97	.0002	.08	.09	161	86	80	253	261	54		3.5
			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSW / East / R20 / Cycle 1

Date 12-16-98

Test Method ODEQ7

Concurrent Testing EPA 25A

Run # 20

Operator JDF Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M-250, 985-52

Stack Diagram

Cyclonic Flow? NO

Probe 3-1 Cp Heat Set 250 °F

Pitot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle .988

Sample Box 2 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter	Pretest	cfm		inHg
Leak Check	Post .016	cfm	14.5	inHg

Moisture 28 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1	1	125	1940	453.97	.0003	.13	.13	162	85	80	255	260	52		4.0
2	1	130	1945	454.94	.0003	.13	.13	162	86	81	253	258	51		4.0
3	2	135	1950	455.77	.0002	.09	.09	163	86	82	254	260	52		3.5
4	2	140	1955	456.62	.0002	.09	.09	161	84	80	254	262	54		3.5
5	3	145	2000	457.67	.0003	.13	.13	162	84	80	255	262	55		4.0
6	3	150	2005	458.72	.0003	.13	.13	163	84	80	255	261	55		4.0
7	4	155	2010	460.02	.0005	.22	.22	163	86	81	252	262	58		6.0
8	4	160	2015	461.19	.0004	.17	.17	163	86	82	253	260	62		5.5
9	5	165	2020	462.51	.0005	.22	.22	163	86	82	253	261	61		6.0
10	5	170	2025	463.80	.0005	.22	.22	164	86	82	253	259	60		6.0
11	6	175	2030	464.967	.0004	.17	.17	163	87	83	248	260	60		5.5
12															
13															
14															
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25															

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU/West/R21/Cycle1

Date 12-16-98
Test Method ODEQ 7
Concurrent Testing EPA 25A
Run # 21
Operator JDF Support
Temperature, Am (Ta) 35
Pressure, Bar (Pb) 30.6
Pressure, Static (Pstat) 0
Filters 98M-283, 985-51

Stack Diagram

Cyclonic Flow? NO

Probe 3-2 Cp Heat Set 250 °F
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle .988
Sample Box 3 Heat Set 250 °F
Meter Box 7 dH@ Y
Meter Pretest .011 cfm 15 inHg
Leak Check Post .005 cfm 15 inHg
Moisture 25 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Tl)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		2036	878.655				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5	2041	.	.0002	.09	.09	148	69	68	277	252	48		10.5
2 1	10	2046	880.54	JUM		BIAS								
3 2	15	2051	881.57	.0003	.13	.13	146	68	68	276	249	57		10.5
4 2	20	2056	882.66	.0003	.13	.13	139	68	68	264	252	46		10.5
5 3	25	2101	883.78	.0003	.13	.13	155	69	68	276	254	47		10.5
6 3	30	2106	884.99	.0001	.04	.04	155	69	68	268	253	51		6.5
7 4	35	2111	885.36	.0002	.09	.09	160	69	68	264	253	51		9.0
8 4	40	2116	886.04	.0001	.04	.04	165	69	69	258	253	52		7.0
9 5	45	2121	886.76	.0001	.04	.04	165	69	69	274	251	52		7.0
10 5	50	2126	888.67	.0011	.48	.48	166	69	69	264	252	54		12.5
11 6	55	2131	890.78	.0012	.52	.52	163	70	69	273	251	57		13.0
12 6	60	2136	892.51	.0012	.52	.52	160	71	69	272	253	61		13.0
13 1	65	2142	894.35	.0006	.26	.26	158	72	69	273	253	65		9.0
14 2	70	2147	896.28	.0010	.44	.44	156	72	69	274	253	68		11.0
15 3	75	2152	898.158	.0009	.39	.39	156	72	69	273	252	66		10.0
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/West/cycle 2/R1

Date 12-16-98

Test Method ODE Q 7

Concurrent Testing EPA 25A

Run # 1

Operator JDF Support COB end

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Filters 98M-206, 98S-15

Probe 3-1 Cp Heat Set °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 6 Heat Set °F

Meter Box 4 dH@ Y

Meter Pretest .013 cfm 14 inHg

Leak Check Post .017 cfm 12 inHg

Stack Diagram

Cyclonic Flow?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
							Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
		1107	465.275											
1	5	1112	469.65	.0390	19	1.7	108	72	71	251	258	39		10.0
2	10	1117	473.89	.0408	19.5	1.8	103	73	70	251	259	40		10.5
3	15	1122	476.80	.037	18	1.8	101	76	71	251	258	42		10.5
4	20	1127	480.67	.0363	17.5	1.8	97	79	72	252	261	49		10.5
5	25	1132	484.81	.0397	18.9	1.8	92	83	73	260	260	55		10.5
6	30	1137	487.18	.0019	.93	.93	93	84	74	254	260	55		7.0
7	35	1142	489.44	.0013	.63	.63	94	84	75	255	260	54		5.5
8	40	1147	491.48	.0010	.49	.49	95	83	75	255	259	54		4.5
9	45	1152	493.55	.0011	.54	.54	97	83	76	256	261	55		4.5
10	50	1157	494.80	.0004	.20	.20	98	83	76	255	259	53		3
11	55	1202	496.05	.0004	.20	.20	101	82	76	254	262	52		3
12	60	1207	496.95	.0002	.10	.10	103	82	77	256	262	53		2
13	65	1212	— . —	.0002	.10	.10	106	81	77	257	262	54		2
14	70	1217	498.96	.0004	.20	.20	111	81	77	256	262	49		3
15	75	1222	500.25	.0004	.20	.20	112	81	77	256	262	49		3
16	80	1227	501.43	.0003	.1464	.15	116	82	78	255	262	46		3
17	85	1232	502.707	.0004	.20	.20	119	82	78	255	261	46		2
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes: Did not take H_2O sample from Run 1

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU / East / cycle 2 / R2

Date 12/17/98

Test Method ODEQ 7

Concurrent Testing 25A

Run # 2

Operator CPS Support

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 1 Heat Set 250 °F

Meter Box 7 dH@ Y

Meter Pretest .005 cfm 15 inHg

Leak Check Post cfm inHg

Stack Diagram

Filters Cyclonic Flow ? Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
	.	1237	898.394											
1 1	5		899.91	.0005	.24	.24	112	63	64	277	252	40		3
2 1	10		901.44	.0003	.15	.15	117	63	63	273	253	41		2
3 2	15		902.54	.0002	.10	.10	127	63	63	275	255	41		2
4 2	20		903.61	.0002	.10	.10	126	63	63	275	255	43		2
5 3	25		.	.0002	.10	.10	134	64	63	274	256	43		2
6 3	30		905.76	Bias Check				JUMP						
7 4	35		906.77	.0002	.10	.10	134	65	64	273	256	45		2
8 4	40		907.81	.0002	.10	.10	133	66	65	273	255	46		2
9 5	45		909.03	.0003	.15	.15	128	66	65	272	255	46		3
10 5	50		910.20	.0003	.15	.15	132	66	65	274	255	49		3
11 6	55		911.40	.0003	.15	.15	137	67	65	273	255	50		3
12 6	60		912.40	.0002	.10	.10	136	68	66	265	255	52		2
13 1	65		913.39	.0002	.10	.10	130	68	66	274	254	47		2
14 1	70		914.37	.0002	.10	.10	130	68	66	273	255	44		2
15 2	75		915.35	.0002	.10	.10	128	68	67	273	256	42		2
16 2	80		— . —	.0002	.10	.10	136	69	67	273	255	41		2
17 3	85		917.54	.0003	.15	.15	144	69	67	275	255	43		3
18 3	90		918.82	.0003	.15	.15	144	69	68	273	252	42		3
19 4	95		920.11	.0003	.15	.15	145	70	68	273	255	41		3
20 4	100		921.38	.0003	.15	.15	144	70	68	272	253	41		3
21 5	105		922.74	.0004	.20	.20	145	70	68	271	252	41		3
22 5	110		924.97	.0003	.15	.15	145	70	68	270	255	41		3
23 6	115		925.02	.0002	.10	.10	145	71	69	272	254	41		3
24 6	120	1237	926.050	.0003	.15	.15	144	71	69	272	254	41		3
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cycle 2

Date 12/17/98
Test Method ODEQ7
Concurrent Testing
Run # 2
Operator CDB Support
Temperature, Am (Ta) 35
Pressure, Bar (Pb) 30.6
Pressure, Static (Pstat) 0

Probe 3-2 Cp Heat Set °F
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle .988
Sample Box 1 Heat Set °F
Meter Box 7 dH@ Y
Meter Pretest cfm inHg
Leak Check Post .00 / cfm 5 inHg

Stack Diagram

Filters Cyclonic Flow? Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DES/RED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		259	926.050											
1 1	5		927.27	.003	.15	.15	145	71	69	276	254	41		3
2 1	10		928.50	.003	.15	.15	145	71	69	274	254	41		3
3 2	15		929.51	.002	.10	.10	145	71	69	274	255	42		3
4 2	20		930.51	.002	.10	.10	145	71	69	275	255	41		3
5 3	25		931.51	.002	.10	.10	145	71	69	273	255	41		3
6 3	30		932.50	.002	.10	.10	145	71	69	275	254	43		3
7 4	35		933.77	.003	.15	.15	145	71	70	274	255	41		3
8 4	40		934.75	.002	.10	.10	145	71	70	275	256	43		3
9 5	45		935.70	.002	.10	.10	145	71	70	275	255	43		3
10 5	50		936.66	.002	.10	.10	145	71	70	275	255	43		3
11 6	55	334	937.638	.002	.10	.10	145	71	70	275	255	43		3
12 6	60		.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

ST
S-T

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU West Cyclo 2

Date 12/17/98

Test Method ODEQ 7

Concurrent Testing 25A

Run # 3

Operator CDP Support

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 6 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest .015 cfm 15 inHg

Leak Check Post cfm inHg

Stack Diagram

Filters Cyclonic Flow? Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		337	502.932				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	5		503.95	.0003	.15	.15	132	71	70	258	262	39		3
1	10		.	.0004	.20	.20	142	71	70	258	262	39		
2	15		—.—											
2	20		507.75	.0005	.24	.24	141	72	70	257	262	37		5
3	25		508.75	.0006	.29	.29	142	72	70	257	261	37		5
3	30		510.15	.0005	.24	.24	142	73	70	256	262	36		5
4	35		511.34	.0004	.20	.20	142	73	71	257	262	37		4
4	40		512.59	.0004	.20	.20	142	74	71	257	262	39		4
5	45		513.97	.0005	.24	.24	142	74	71	257	262	37		5
5	50		515.34	.0005	.24	.24	142	76	72	256	262	37		5
6	55		—.—	.0004	.20	.20	142	76	72	257	261	37		4
6	60		518.06	.0006	.29	.29	142	78	73	257	262	38		5
1	65		519.44	.0005	.24	.24	142	78	74	256	261	37		5
1	70		520.70	.0004	.20	.20	142	79	74	255	262	37		4
2	75		521.97	.0004	.20	.20	142	79	74	256	261	37		4
2	80		523.23	.0004	.20	.20	142	79	75	256	262	37		4
3	85		524.49	.0004	.20	.20	142	80	75	256	262	37		4
3	90		525.80	.0004	.20	.20	142	80	76	255	261	37		4
4	95		526.70	.0002	.10	.10	142	80	76	256	262	37		3
4	100		528.10	.0005	.24	.24	143	80	76	256	262	37		5
5	105		529.23	.0003	.15	.15	143	81	77	256	262	37		3
5	110		530.68	.0005	.24	.24	143	81	77	255	261	37		5
6	115		532.09	.0004	.20	.20	143	82	77	255	261	37		4
6	120	537	533.545	.0005	.24	.24	143	81	77	255	261	38		5
			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU West Cyclone

Date 12/17/98

Test Method ODEQ 7

Concurrent Testing 25A

Run # 3

Operator CDB Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.6

Pressure, Static (Pstat) 0

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 6 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest cfm inHg

Leak Check Post .008 cfm 6 inHg

Stack Diagram

Filters Cyclonic Flow? Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		539	533.545											
1 1	5		534.52	.0002	.10	.10	142	80	78	256	262	40		3
2 1	10		535.63	.0003	.15	.15	142	80	77	256	261	42		4
3 2	15		536.77	.0003	.15	.15	142	80	77	256	261	42		4
4 2	20		537.91	.0003	.15	.15	143	80	77	255	262	42		4
5 3	25		538.90	.0002	.10	.10	142	81	77	255	262	43		3
6 3	30		540.03	.0003	.15	.15	143	80	77	255	260	42		4
7 4	35		541.17	.0003	.15	.15	143	80	77	255	260	42		4
8 4	40		542.63	.0005	.24	.24	143	80	77	255	260	44		5
9 5	45		543.77	.0003	.15	.15	143	80	77	254	262	44		4
10 5	50	629	544.908	.0003	.15	.15	143	80	77	256	262	44		4
11 6	55		.											
12 6	60		.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cycle 2

Date 12/17/98
Test Method OD EQ 7
Concurrent Testing 2SA
Run # 4
Operator EDB Support
Temperature, Am (Ta) 35
Pressure, Bar (Pb) 30.6
Pressure, Static (Pstat) C

Probe 3-2 Cp Heat Set 250 °F
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle .988
Sample Box 1 Heat Set 250 °F
Meter Box 7 dH@ Y
Meter Pretest .01 cfm 1.5 inHg
Leak Check Post cfm inHg

Stack Diagram

Filters Cyclonic Flow? Moisture 18 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		637	937.817				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	5		939.31	.0005	.24	.24	128	65	65	274	255	44		3
2	10		.	.0002	.10	.10	143	65	65	272	255	47		2
3	15		941.28		Bias	Check JVM								
4	20		942.26	.0002	.10	.10	142	64	65	276	255	52		2
5	25		943.23	.0002	.10	.10	143	65	65	273	257	52		2
6	30		944.45	.0003	.15	.15	143	65	64	273	255	48		3
7	35		945.68	.0003	.15	.15	144	65	65	272	255	45		3
8	40		946.91	.0003	.15	.15	144	66	65	273	255	46		3
9	45		948.16	.0003	.15	.15	144	66	65	273	256	45		3
10	50		949.16	.0002	.10	.10	143	67	65	274	255	45		2
11	55		950.17	.0002	.10	.10	142	68	66	275	255	45		2
12	60	737	951.19	.0002	.10	.10	143	69	66	275	257	44		2
13	65		952.41	.0003	.15	.15	143	69	66	276	257	46		3
14	70		953.63	.0003	.15	.15	143	69	67	275	255	46		3
15	75		954.83	.0003	.15	.15	143	69	68	274	257	46		3
16	80		957.17	.0013	.63	.63	143	69	68	274	255	45		6
17	85		959.49	.0013	.63	.63	143	71	68	276	255	47		6
18	90		.	.0013	.63	.63	143	72	68	273	255	47		6
19	95		.											
20	100		966.54	.0007	.34	.34	144	74	69	272	253	45		6
21	105		968.888	.0008	.46	.46	144	74	69	272	253	43		5
22	110		970.34	.0007		.40	145	74	70	274	256	44		4
23	115		972.10	.0007		.40	145	74	70	274	255	44		4
24	120	837	973.968	.0007		.40	144	75	70	270	256	44		4
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU / East / Cyc 2

Date 12-17-98
Test Method 7
Concurrent Testing 25A
Run # 4
Operator DRS Support
Temperature, Am (Ta) 35
Pressure, Bar (Pb) 30.68
Pressure, Static (Pstat) 0
Filters 98M-200 98S-14

Probe 3-2 Cp Heat Set 250 °F
Pilot Pretest in in/min
Leak Check Post 3 in 0 in/min
Nozzle 988
Sample Box 1 Heat Set 250 °F
Meter Box 7 dH@ 1.76 Y 1
Meter Pretest cfm inHg
Leak Check Post 0.015 cfm 9 inHg
Moisture 18 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		838	973.968											
1 6	5		. Dry	.0005	.287	.29	144	73	71	273	255	41		4
2 6	10		.	Silica		Gel								
3 5	15		978.79	.0005		.30	144	72	71	273	256	44		4
4 5	20		980.46	.0005		.30	144	72	71	272	255	45		4
5 4	25		982.13	.0006	.344	.34	145	72	71	270	255	44		4
6 4	30	908	983.67	.0004		.26	145	72	71	273	253	44		4
7 3	35		985.32	.0006		.34	145	72	71	272	255	46		4
8 3	40		987.12	.0006		.34	145	72	70	273	250	47		4
9 2	45		988.75	.0005		.30	145	72	70	273	254	48		4
10 2	50	928	990.334	.0005		.30	145	72	70	273	255	49		4
11 1			.											
12 1			.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU/west/cyc 2

Date 12-17-98

Test Method 7

Concurrent Testing 25A

Run # 5 west cyc 2

Operator DRO Support

Temperature, Am (Ta) 410

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters 98m-206 98s-15

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .188

Sample Box 6 Heat Set °F

Meter Box 4 dH@ Y

Meter Pretest 0.005 cfm 10 inHg

Leak Check Post cfm inHg

Stack Diagram

Cyclonic Flow?

Moisture 18 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		936	544.971				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 6	5		Cal Sm	.0004		.25	141	66	66	256	261	40		7
2 6	10		.	.0006	.336	.34	141	66	66	256	261	40		8
3 5	15		549.50	.0006		.34	141	67	66	256	261	40		8
4 5	20		551.64	.0010	.559	.56	141	68	66	256	262	40		10
5 4	25		553.00	.0004	.224	.22	142	69	66	255	261	40		5
6 4	30		554.250	.0004		.22	142	70	67	255	261	41		5
7 3	35		555.5555	.0012	.679	.68	142	71	67	255	261	41		5
8 3	40		558.88	.0012		.68	142	74	68	245	261	43		9
9 2	45		561.325	.0013		.68	142	76	69	245	261	44		9
10 2	50		.	.0014	.779	.78	142	77	70	256	261	46		9½
11 1	55		566.46	.0018	1.0	.86	142	79	71	255	261	46		9½
12 1	60		569.48	.0018		1.0	140	80	72	253	261	46		10
13 1	65		572.62	.0018		1.0	141	81	73	256	262	45		10
14 1	70		575.27	.0017		.95	141	82	74	251	261	46		9
15 2	75		.	.0018		1.0	141	83	74	257	262	48		10
16 2	80		.			1.1								
17 3	85		584.000	.0017		.95	141	84	76	258	262	53		9
18 3	90		587.17	.0018		1.0	141	84	76	258	262	55		9
19 4	95		5 .	.0017		.95	140	84	77	255	262	56		8
20 4	100		592.082	.0002	.115	.12	143	84	78	258	262	56		3
21 5	105		593.02	.0002		.12	143	83	78	258	262	56		3
22 5	110		590.92	.0002		.12	143	82	78	257	263	54		3
23 6	115		594.91	.0002		.12	143	82	78	256	262	53		3
24 6	120	1136	595.86	.0002		.12	144	81	78	256	262	53		3
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU / west Kruse 2

Date 12-17-99

Test Method 7

Concurrent Testing 25A

Run # 5 cont

Operator DRB Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters 98M-206 985-15

Cyclonic Flow ?

Stack Diagram

Probe 3-1 Cp 0.8 Heat Set 250 °F

Pitot	Pretest	in		in/min
Leak Check	Post	in		in/min

Nozzle 988

Sample Box 6 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter	Pretest	cfm		inHg
Leak Check	Post 0.012	cfm	11	inHg

Moisture 18 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
	.	1156	595.860											
1	6	5	5 .	.0003	.172	.17	145	79	78	257	262	46		3
2	6	10	598.30	.0003		.17	145	80	79	257	262	46		3
3	5	15	.	.0003		.17	145	80	78	257	263	46		3
4	5	20	.			.17								
5	4	25	.			.17								
6	4	30	1226 603.08	.0003		.17	147	82	80	257	263	47		3
7	3	35	1231 604.19	.0003		.17	147	82	80	257	262	47		3
8	3		.											
9			.											
10			.											
11			.											
12			.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU / East / cyc 2

Date 12-17-98

Test Method 7

Concurrent Testing 25A

Run # 6 east cyc 2

Operator DR3 Support

Temperature, Am (Ta) 42

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters M-200 S-14

Probe 3-2 Cp 0.8 Heat Set 250 °F

Pitot | Pretest | in | in/min

Leak Check | Post | in | in/min

Nozzle .188

Sample Box 1 Heat Set 250 °F

Meter Box 7 dH@ 1.758 Y .977

Meter | Pretest 0.003 cfm 14 | inHg

Leak Check | Post cfm | inHg

Stack Diagram

Cyclonic Flow?

Moisture 18 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1236	990.603											
1 6	5		.	.0002	.115	.12	137	71	71	272	255	42		3
2 6	10		99 .	.0002		.12								3
3 5	15		993.8	.0002		.12	146	70	70	274	255	55		3
4 5	20		995.00	.0002		.12	146	70	70	274	255	53		3
5 4	25		996.91	.0002		0.23	148	71	71	275	251	51		3
6 4	30		997.89	.0005		.28	149	71	71	274	255	50		4
7 3	35		999.55	.0005		.29	149	72	71	275	254	50		4
8 3	40		.	.0001	.06	.06	149	73	71	275	253	50		4
9 2	45		.			.06								
10 2	50		1001.	.0002		.06								
11 1	55		2.91	.0006	.346	.35	150	74	72	270	260	50		4
12 1	60	1336	4.71	.0006		.35	150	74	72	272	255	49		4
13 1	65		6.33	.0005		.29	149	74	72	273	250	47		4
14 1	70		8.21	.0006		.35	150	74	72	272	255	48		5
15 2	75		9.57	.0005		.29	150	75	72	272	254	48		4
16 2	80		11.34	.0006		.35	150	75	72	272	254	47		4
17 3	85		.	.0005		.29	150	75	73	272	254	49		4
18 3	90		14.61	.0005		.29	150	75	73	272	252	49		4
19 4	95		.	.0005		.29	150	75	73	272	252	49		4
20 4	100		.	.0005										
21 5	105		.											
22 5	110		20.99	.0006		.35	150	75	73	272	255	51		5
23 6	115		22.91	.0006		.35	150	75	73	272	255	51		5
24 6	120	1436	24.738	.0006		.35	150	75	73	271	254	52		5
25			.											

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/East/C2

Date: 12-17-98
Test Method: 7
Concurrent Testing: 25A
Run #: 6 cont Cyc 2
Operator: DGR Support
Temperature, Amb (Ta): 42
Pressure, Bar (Pb): 30.7
Pressure, Static (Pstat): 0
Filters: 99m200 S-14

Stack Diagram

Cyclonic Flow?

Probe: S-L Cp: Heat Set: °F
Pitot: Pretest: in: in/min
Leak Check: Post: in: in/min
Nozzle: .988
Sample Box: 1 Heat Set: °F
Meter Box: 1 dH@: Y
Meter: Pretest: cfm: inHg
Leak Check: Post: 0.003 cfm: 6 inHg
Moisture: 18 Tdb: Twb:

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
	.	1438	24.738				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 6	5		26.21	.0004		.23	149	74	72	273	253	53		3
2 6	10		27.61	.0004		.23	151	74	72	272	253	55		3
3 5	15		29.03	.0004		.23	151	74	72	272	253	55		3½
4 5	20		30.43	.0004		.23	151	74	72	272	254	54		3½
5 11	25		31.82	.0004		.23	152	74	72	272	251	53		3½
6 4	30		33.1	.0004		.23	153	73	72	273	254	54		3½
7 3	35		34.41	.0002	.116	.12	150	72	71	273	252	52		3
8 3	40		35.40	.0002		.12	149	72	71	272	253	52		3
9 2	45		.	.0004		.23	148	71	71	270	251	54		3
10 2	50		38.24	.0002		.12	147	71	70	271	251	54		3
11 1	55	1533	39.300	.0002		.12	147	71	70	271	251	53		3
12 1			.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU / west / Cyc 2

Date 12-17-98 | Probe 3-1 | Cp | Heat Set 250 °F

Test Method 7 | Pitot | Pretest | in | in/min

Concurrent Testing 25A | Leak Check | Post | in | in/min

Run # 7 cyc 2 west | Nozzle 988

Operator RRB | Support JDF | Sample Box 6 | Heat Set °F

Temperature, Am (Ta) 45 | Meter Box 4 | dH@ | Y

Pressure, Bar (Pb) 30.7 | Meter | Pretest 0.011 cfm | 12 inHg

Pressure, Static (Pstat) 0 | Stack Diagram | Leak Check | Post | cfm | inHg

Filters 98m 206 5-15 | Cyclonic Flow? | Moisture 18 | Tdb | Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1537	604.609				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	6 5		Cal	.0003		.17	145	65	65	254	261	45		2½
2	6 10		JUM											
3	5 15		608.58	.0011	.612	.61	146	65	65	254	261	46		5
4	5 20		610.875	.0011		.61	146	66	65	252	261	46		5
5	4 25		613.18	.0011		.61	146	67	65	254	261	48		5
6	4 30		615.44	.0011		.61	147	69	65	253	261	52		5
7	3 35		617.66	.0011		.61	147	70	65	254	262	53		5
8	3 40	1612	619.85	.0010	.56	.56	147	71	66	254	262	56		5.0
9	2 45	1617	622.30	.0013	.72	.72	147	72	67	254	263	58		6.0
10	2 50	1627	624.82	.0014	.78	.78	148	74	67	255	261	62		6.5
11	1 55	1632	627.08	.0011	.61	.61	147	77	70	255	261	64		5.5
12	1 60	1637	629.73	.0015	.84	.84	148	78	70	257	261	67		6.5
13	1 65	1642	632.42	.0016	.89	.89	148	80	72	256	262	62		7.0
14	1 70	1647	634.70	.0011	.61	.61	147	81	72	256	262	58		5.5
15	2 75	1652	637.19	.0013	.72	.72	149	82	73	258	262	55		6.0
16	2 80	1657	639.87	.0014	.78	.78	149	83	74	258	262	53		6.0
17	3 85	1702	642.74	.0020	1.1	1.1	149	84	75	257	262	54		7.5
18	3 90	1707	645.26	.0013	.72	.72	150	87	76	258	262	56		6.0
19	4 95	1712	648.03	.0017	.95	.95	150	86	77	257	262	57		7.0
20	4 100	1717	650.32	.0012	.67	.67	149	88	78	257	262	59		6.0
21	5 105	1722	652.16	.0007	.39	.39	150	89	80	257	261	58		4.5
22	5 110	1727	654.08	.0008	.45	.45	150	88	80	257	261	57		4.5
23	6 115	1732	655.95	.0007	.39	.39	150	89	81	256	261	59		4.5
24	6 120	1737	658.13	.0010	.56	.56	150	90	82	256	261	59		5.0
25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSJ/West/Cyc 2

Date 12-17-98

Test Method OPEQ7

Concurrent Testing EPA 25A

Run # 7 Cyc 2 West

Operator JDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters 98M-206, 98S-15

Stack Diagram

Cyclonic Flow? NO

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 6 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest cfm inHg

Leak Check Post .012 cfm 15 inHg

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1	1	125	1745	6660.46	.0011	.61	.61	150	91	83	256	261	61		5.5
2	1	130	1750	662.98	.0013	.72	.72	150	93	84	256	251	65		6.0
3	2	135	1755	665.91	.0017	.95	.95	150	93	86	253	261	70		7.5
4	2	140	1800	667.99	.0009	.50	.50	150	94	86	256	261	60		5.0
5	3	145	1805	669.96	.0008	.45	.45	150	94	87	255	261	54		5.0
6	3	150	1810	671.62	.0006	.33	.33	150	94	87	256	260	50		4.0
7	4	155	1815	.	.0007	.39	.39	150			255				
8	4	160	1820	.	.0013	.72	.72								
9	5	165	1825	.											
10	5	170	1830	.											
11	6	175	1835	683.352											
12			.												
13			.												
14			.												
15			.												
16			.												
17			.												
18			.												
19			.												
20			.												
21			.												
22			.												
23			.												
24			.												
25			.												

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/cycle 2/east

Date 12-17-98

Test Method ODE Q7

Concurrent Testing EPA 25A

Run # 8

Operator JDF Support

Temperature, Am (Ta) 40

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters 98M-200, 995-14

Stack Diagram

Cyclonic Flow ?

Probe 3-2 Cp Heat Set 250 °F

Pitot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle

Sample Box 1 Heat Set 250 °F

Meter Box 7 dH@ Y

Meter	Pretest .012	cfm	14	inHg
Leak Check	Post	cfm		inHg

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ta) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1837	039.514											
1	5	1842	.	.0005	.28	.28	136	71	72	272	253	55		3.0
1	10	1847	.											
2	15	1852	. JUM		BIAS									
2	20	1857	.											
3	25	1902	.											
3	30	1907	.											
4	35	1912	.											
4	40	1917	.											
5	45	1922	.											
5	50	1927	054.86											
6	55	1932	056.55	.0007	.39	.39	149	73	71	272	256	69		3.5
6	60	1937	058.16	.0005	.28	.28	150	73	71	275	255	72		3.0
6	65	1942	059.83	.0005	.28	.28	149	73	71	274	255	61		3.0
6	70	1947	061.45	.0006	.33	.33	149	73	71	275	254	57		3.0
5	75	1952	062.99	.0005	.28	.28	149	74	71	273	255	53		3.0
5	80	1957	064.52	.0005	.28	.28	150	73	71	273	254	51		3.0
4	85	2002	066.04	.0005	.28	.28	150	72	71	274	254	51		3.0
4	90	2007	067.55	.0005	.28	.28	150	72	71	273	255	48		3.0
3	95	2012	069.06	.0006	.33	.33	150	72	71	275	254	48		3.0
3	100	2017	070.56	.0006	.33	.33	150	72	71	274	254	51		3.0
2	105	2022	072.04	.0006	.33	.33	150	72	71	274	255	51		3.0
2	110	2027	073.53	.0006	.33	.33	150	72	71	273	256	53		3.0
1	115	2032	075.20	.0005	.28	.28	151	72	71	274	256	52		3.0
1	120	2037	076.90	.0005	.28	.28	151	72	71	274	255	53		3.0
			.											

Notes:

Field Data Sheet

Horizon Engineering

Date 12-17-98
Test Method ODEQ M7
Concurrent Testing EPA M25A
Run # 8
Operator SDF Support
Temperature, Am (Ta) 35
Pressure, Bar (Pb) 30.7
Pressure, Static (Pstat) 0
Filters 98M-200, 98S-14

Client/Plant/Location : OSU 1, 2/East

Probe 3-2 Cp Heat Set 250 °F
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle .988
Sample Box 1 Heat Set 250 °F
Meter Box 7 dH@ Y
Meter Pretest cfm 6 inHg
Leak Check Post .002 cfm 6 inHg
Moisture 18 Tdb NA Twb NA

Stack Diagram
Cyclonic Flow ? NO

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1 1	125	2045	078.88	.0007	.39	.39	151	72	71	275	254	56		4.0
2 1	130	2050	080.53	.0006	.33	.33	151	73	71	273	255	57		3.0
3 2	135	2055	082.08	.0005	.28	.28	152	73	71	273	255	59		3.0
4 2	140	2100	083.53	.0004	.23	.23	151	73	71	273	255	60		3.0
5 3	145	2105	085.31	.0006	.33	.33	151	73	71	274	255	61		3.5
6 3	150	2110	086.68	.0005	.28	.28	151	73	71	274	256	64		3.0
7 4	155	2115	088.11	.0005	.28	.28	151	73	71	275	254	64		3.0
8 4	160	2120	089.51	.0004	.23	.23	151	73	71	275	256	64		3.0
9 5	165	2125	091.27	.0006	.33	.33	152	73	71	272	254	63		3.0
10 5	170	2130	092.71	.0004	.23	.23	152	74	71	272	255	63		3.0
11 6	175	2135	094.232	.0005	.28	.28	152	74	71	272	254	61		3.5
12			.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU/Cycle 2/West

Date 12-17-98

Test Method OOEQ7

Concurrent Testing EPA 25A

Run # 9

Operator SDF Support COB

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters 98M-206, 98S-15

Stack Diagram

Cyclonic Flow?

Probe 3-1 Cp Heat Set °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 6 Heat Set °F

Meter Box 4 dH@ Y

Meter Pretest .008 cfm 15 inHg

Leak Check Post .017 cfm 14 inHg

Moisture 18 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		2137	683.505											
1 1	5	2142	.	.0024	1.33	1.35	135	75	75	258	262	52		11.0
2 1	10	2147	.	SWA		B	1	A	S					
3 2	15	2152	.											
4 2	20	2157	698.73											
5 3	25	2202	701.71	.0018	1.0	1.0	147	79	74	253	261	52		9.0
6 3	30	2207	704.53	.0016	.89	.89	147	80	74	256	263	64		7.5
7 4	35	2212	707.30	.0016	.89	.89	148	80	74	254	262	54		7.0
8 4	40	2217	709.89	.0017	.95	.95	147	82	75	245	262	48		7.0
9 5	45	2222	712.99	.0018	1.0	1.0	148	82	75	257	263	46		7.0
10 5	50	2227	714.49	.0005	.28	.28	147	82	76	255	262	47		3.5
11 6	55	2232	715.98	.0005	.28	.28	147	81	76	258	262	46		3.5
12 6	60	2237	717.72	.0004	.22	.22	147	80	76	257	261	46		3.0
13 6	65	2242	719.08	.0004	.22	.22	148	80	76	257	261	46		3.0
14 6	70	2247	720.77	.0007	.39	.39	148	80	76	257	262	47		4.0
15 5	75	2252	722.08	.0004	.22	.22	148	80	76	257	261	46		3.0
16 5	80	2257	723.56	.0005	.28	.28	148	81	77	258	262	49		3.5
17 4	85	2302	724.81	.0004	.22	.22	149	81	77	256	262	47		3.0
18 4	90	2307	726.36	.0005	.28	.28	149	81	77	256	262	46		3.5
19 3	95	2312	727.87	.0005	.28	.28	149	81	77	257	262	48		3.5
20 3	100	2317	729.47	.0006	.33	.33	149	82	78	257	262	52		4.0
21 2	105	2322	731.05	.0005	.28	.28	150	82	78	258	262	53		4.0
22 2	110	2327	732.82	.0007	.39	.39	150	82	78	256	262	52		4.5
23 1	115	2332	734.22	.0005	.28	.28	150	82	78	256	262	52		4.0
24 1	120	2337	735.805	.0005	.28	.28	150	82	78	257	262	55		4.0
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU / Cycle 2 / West

Date 12-17-98

Test Method ODEQ 7

Concurrent Testing EIA 2SA

Run # 9

Operator CDB Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Filters 98M-206, 98S-15

Stack Diagram

Cyclonic Flow? NO

Probe 3-1 Cp Heat Set 250 °F

Pitot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle .988

Sample Box 6 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter	Pretest	cfm	inHg
Leak Check	Post	cfm	inHg

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
1	1	125	2345	737.35	.0005	.28	.28	138	81	78	258	261	55		4.0
2	1	130	2350	739.38	.0009	.50	.50	138	82	78	257	262	65		5.0
3	2	135	2355	741.33	.0008	.45	.45	137	82	78	257	261	62		4.5
4	2	140	2400	743.30	.0008	.45	.45	139	83	78	257	262	59		5
5	3	145	0005	745.25	.0008	.45	.45	139	83	78	257	262	59		5
6	3	150	0010	747.23	.0009	.50	.50	139	83	78	251	262	62		5
7	4	155	0015	749.29	.0009	.50	.50	138	83	78	257	262	53		5
8	4	160	0020	751.26	.0008	.45	.45	139	83	79	252	262	59		4
9	5	165	0025	753.75	.0013	.72	.72	140	83	79	257	261	61		6
10	5	170	0030	755.783	.0008	.45	.45	137	84	79	252	261	61		5
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU East Cyclone 2

Date 12-18-98

Test Method ODEQ 7

Concurrent Testing 2SA

Run # 10

Operator CDB Support

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box Heat Set 250 °F

Meter Box 7 dH@ Y

Meter Pretest .010 cfm 10 inHg

Leak Check Post cfm inHg

Filters

Stack Diagram

Cyclonic Flow ?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1239	94.800											
1 1	5		97.22	.0012	.67	.67	137	66	66	273	255	50		6
2 1	10		.	.0005	.28	.28	146	66	66	272	254	56		
3 2	15		.	Bias Check Run										
4 2	20		101.58											
5 3	25		102.78	.0003	.17	.17	149	65	65	273	255	60		4
6 3	30		103.86	.0002	.11	.11	149	66	65	273	255	50		3
7 4	35		104.94	.0002	.11	.11	149	66	65	274	255	46		3
8 4	40		106.02	.0002	.11	.11	149	66	65	273	255	45		3
9 5	45		107.10	.0002	.11	.11	149	66	65	273	255	43		3
10 5	50		108.18	.0002	.11	.11	149	66	65	273	255	43		3
11 6	55		109.31	.0002	.11	.11	148	67	66	273	254	42		3
12 6	60		110.41	.0002	.11	.11	149	67	66	272	254	41		3
13 6	65		111.68	.0003	.17	.17	149	68	66	274	255	44		4
14 6	70		113.01	.0003	.17	.17	149	68	66	272	256	47		4
15 5	75		114.25	.0003	.17	.17	149	68	66	272	255	49		4
16 5	80		115.26	.0002	.11	.11	150	68	66	272	254	50		3
17 4	85		116.77	.0004	.22	.22	149	69	67	273	254	49		4
18 4	90		117.99	.0003	.17	.17	149	69	67	275	256	51		4
19 3	95		119.24	.0003	.17	.17	150	69	67	273	255	50		4
20 3	100		—.—	.0002	.11	.11	149	69	67	275	255	51		3
21 2	105		121.44	.0002	.11	.11	150	70	68	275	255	51		3
22 2	110		122.72	.0003	.17	.17	149	69	68	275	255	52		4
23 1	115		124.00	.0003	.17	.17	149	69	68	273	254	54		4
24 1	120	239	125.121	.0002	.11	.11	150	69	68	273	254	51		3
25			.											

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location : OSU East Cycle 2

Date 12/18/98

Test Method OPEG 7

Concurrent Testing 254

Run # 10

Operator CDB Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Probe 3-2 Cp Heat Set 250 °F

Pilot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle .988

Sample Box Heat Set 250 °F

Meter Box 7 dH@ Y

Meter	Pretest	cfm	inHg
Leak Check	Post .01	cfm 15	inHg

Stack Diagram

Cyclonic Flow ?

Filters

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		242	125.121											
1 1	5		126.16	.0002	.11	.11	149	69	67	273	255	50		3
2 1	10		127.19	.0002	.11	.11	149	68	67	274	254	47		3
3 2	15		128.17	.0002	.11	.11	150	68	67	274	254	49		3
4 2	20		129.03	.0002	.11	.11	150	68	67	275	255	46		3
5 3	25		130.36	.0004	.22	.22	150	68	67	273	255	52		11
6 3	30		131.32	.0002	.11	.11	150	68	67	274	256	52		7
7 4	35		132.27	.0002	.11	.11	150	68	66	273	255	50		7
8 4	40		133.24	.0002	.11	.11	150	68	66	274	254	51		7
9 5	45		134.12	.0002	.11	.11	151	67	66	275	255	50		7
10 5	50	332	135.059	.0002	.11	.11	152	67	66	273	254	50		7
11 6	55													
12 6	60													
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU west Cycle 2

Date 12/18/98

Test Method ODEQ 7

Concurrent Testing 254

Run # 11

Operator CDS Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Probe 3-1 Cp Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box 6 Heat Set 250 °F

Meter Box 4 dH@ Y

Meter Pretest .008 cfm 1.5 inHg

Leak Check Post cfm inHg

Filters Cyclonic Flow ? Stack Diagram

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		340	755.942											
1 1	5		758.72	.0015	.84	.84	140	65	64	257	262	44		14
2 1	10		.	.0010	.56	.56	145	65	64	255	261	48		11
3 2	15		763.18	Bias check			JUMP							
4 2	20	419	765.58	.0012	.67	.67	147	65	64	256	230	40		11
5 3	25		767.90	.0012	.67	.67	148	66	64	255	264	47		11
6 3	30		769.93	.0009	.50	.50	148	67	64	254	260	48		8
7 4	35		772.11	.0010	.55	.55	150	68	64	256	262	54		10
8 4	40		774.30	.0010	.55	.55	151	69	64	256	261	55		10
9 5	45		776.98	.0015	.84	.84	151	71	65	256	261	63		13
10 5	50		779.22	.0010	.55	.55	151	73	66	255	261	68		10
11 6	55		781.35	.0010	.55	.55	151	74	67	257	262	64		9
12 6	60		783.60	.0011	.61	.61	151	74	68	257	267	65		10
13 6	65		785.90	.0011	.61	.61	151	76	69	257	262	68		10
14 6	70		788.01	.0009	.50	.50	152	76	69	257	262	67		9
15 5	75		790.29	.0011	.61	.61	151	77	70	257	262	60		9
16 5	80		792.70	.0012	.67	.67	152	77	70	257	262	57		9
17 4	85		795.17	.0012	.67	.67	152	78	71	257	263	60		9
18 4	90		797.55	.0012	.67	.67	152	78	71	256	262	61		8
19 3	95		799.93	.0012	.67	.67	152	78	72	257	262	64		8
20 3	100		802.03	.0009	.50	.50	152	78	72	256	262	59		7
21 2	105		803.67	.0005	.28	.28	152	79	73	257	263	64		6
22 2	110		805.68	.0010	.55	.55	152	78	73	257	263	66		7
23 1	115		807.98	.0011	.61	.61	152	78	73	257	262	66		8
24 1	120	559	810.421	.0012	.67	.67	152	78	73	257	263	59		8
25			.											

Notes: Filter Heat failed @ 358 stopped Test to Repair
Restarted @ 417

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU west Cycle 2

Date 12/18/98

Test Method 5 DEG 7

Concurrent Testing 25A

Run # 11

Operator CDS Support

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.7

Pressure, Static (Pstat) 0

Stack Diagram

Probe 3-1 Cp Heat Set °F

Pilot Pretest in in/min

Leak Check Post in in/min

Nozzle

Sample Box 6 Heat Set °F

Meter Box 4 dH@ Y

Meter Pretest cfm inHg

Leak Check Post .008 cfm 15 inHg

Filters Cyclonic Flow ? Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Tl) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		601	810.421											
1 1	5		811.53	.0003	.17	.17	148	77	74	259	263	51		5
2 1	10		—.—	.0005	.28	.28	148	77	74	257	262	49		8
3 2	15		814.76	.0006	.33	.33	149	77	74	256	262	46		9
4 2	20		815.98	.0003	.17	.17	151	77	74	256	262	45		7
5 3	25		817.34	.0004	.22	.22	151	77	74	256	262	47		7
6 3	30	631	819.191	.0007	.39	.39	151	77	74	256	261	45		10
7 4	35		.											
8 4	40		.											
9 5	45		.											
10 5	50		.											
11 6	55		.											
12 6	60		.											
13			.											
14			.											
15			.											
16			.											
17			.											
18			.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU East Cycle 2

Date 12/18/98

Test Method CDEQ7

Concurrent Testing 2SA

Run # 12/east/cyc 2

Operator CDB Support DRH

Temperature, Am (Ta) 35

Pressure, Bar (Pb) 30.4

Pressure, Static (Pstat) 0

Probe Cp Heat Set °F

Pilot Pretest in in/min

Leak Check Post in in/min

Nozzle

Sample Box Heat Set °F

Meter Box dH@ Y

Meter Pretest .01 cfm 15 inHg

Leak Check Post cfm inHg

Filters Cyclonic Flow? Stack Diagram Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Tl) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		640	135.204											
1 1	5		137.41	.0010	.55	.55	144	64	64	270	252	48		9
2 1	10		.	.0003	.17	.17	146	64	64	270	252	49		5
3 2	15		139.66	.	Bias Check				JUM					
4 2	20		140.71	.0002	.11	.11	147	64	63	273	254	49		4
5 3	25		141.75	.0002	.11	.11	147	65	64	273	253	50		4
6 3	30		142.78	.0002	.11	.11	148	65	64	272	252	49		4
7 4	35		143.84	.0002	.11	.11	149	65	64	272	254	47		5
8 4	40		145.32	.0004	.22	.22	150	65	64	272	254	44		6
9 5	45		— . —	.0003	.17	.17	149	66	65	272	254	41		5
10 5	50		147.98	.0004	.22	.22	150	66	65	273	253	39		6
11 6	55		149.16	.0003	.17	.17	150	66	65	270	253	39		5
12 6	60		150.87	.0005	.28	.28	150	67	65	273	255	39		6
13 6	65		152.22	.0004	.22	.22	150	67	65	271	254	39		5
14 6	70		153.58	.0004	.22	.22	149	68	66	274	252	43		5
15 5	75		155.21	.0005	.28	.28	150	68	66	273	252	44		6
16 5	80		156.52	.0003	.17	.17	151	68	66	272	255	44		4
17 4	85		.	.0003	.17	.17	151	68	66	254	255	44		4
18 4	90		.											
19 3	95		160.24	.0004		.17	150	68	66	270	250	42		4
20 3	100		161.55	.0003		.17	149	68	66	270	250	41		4
21 2	105		162.77	.0003		.17	140	67	66	257	251	42		4
22 2	110		163.755	.0002		.11	130	67	66	257	251	42		4
23 1	115		164.68	.0002		.11	121	67	66	270	255	43		3
24 1	120		165.748	.0002		.11	122	67	66	272	255	43		3
25			.											

Notes:

Field Data Sheet

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Client/Plant/Location: OSU / East / cyc 2

Date 12-18-98

Test Method 7

Concurrent Testing 25A

Run # 12 cont E cyc 2

Operator DRB Support

Temperature, Amt (Ta) 38

Pressure, Bar (Pb) 30.4

Pressure, Static (Pstat) 0

Filters 98m-200 99s-14

Probe 3-2 Cp Heat Set 750

Pilot Pretest in In/mh

Leak Check Post in In/mh

Nozzle 988

Sample Box 1 Heat Set

Meter Box 7 dH@ Y

Meter Pretest cfm In Hg

Leak Check Post 0.015 cfm 10 In Hg

Moisture 18 %b Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Orifice Pressure Drop in H2O (dH)	Orifice Pressure Differential in H2O	Velocity Pressure in H2O (dP)	STACK °F (Ts) Amb:	REFUX Inlet/Avg °F (Tm-in) Amb:	REFUX Outlet °F (Tm-out) Amb:	FRIDGE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum in Hg (Pv)
		844	165.748											
1 6	5		166.	.0003	.17	.17	150	66	65	273	253	43		4
2 6	10		168.19	.0003		.17	149	66	65	270	255	43		4
3 5	15		169.59	.0003		.17	149	66	65	270	250	43		4
4 5	20		170.95	.0004		.23	150	66	65	270	250	44		5
5 4	25		173.32	.0003		.17	150	66	65	270	250	44		5
6 4	30	914	175.57	.0003		.17	154	67	65	272	253	47		5
1 3	35		[illegible]	.0004		.23	153	67	66	272	252	49		5
2 3	40	924	178.07	.0004		.23	153	67	66	272	257	49		5
3 2	45	929	177.545	.0004		.23	153	67	66	272	253	49		5
4 2														
5														
6														
7														
8														
9														
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25														

Notes:

Field Data Sheet

[21] environmental [13] engineering

Client/Plant/Location: OSU/west/C2

Date 12-18

Test Method 7

Concurrent Testing 25A

Run # 13 cyc 2 West

Operator RRB Support

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.4

Pressure, Static (Pstat) 0

Filters 98206 - 5-15

Probe 3-1 Cp Heat Set 250

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle 9188

Sample Box 6 Heat Set 250

Meter Box 4 dH@ Y

Meter Pretest 0.013 cfm 16 in Hg

Leak Check Post cfm in Hg

Moisture 18

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head in H2O (ΔPv)	Orifice Pressure in H2O (ΔH)	Stack Temperature °F (Ts)	Probe Temperature °F (Tp)	Dry Gas Meter Inlet °F (Tm in)	Dry Gas Meter Outlet °F (Tm out)	Filter Temperature °F (Tf)	Condenser Outlet °F (Tc)	Dry Gas Meter Outlet °F (Tf)	ABS °F (Ts)	Pump Vacuum in Hg (Pv)
		938	819.396											
1 6	5		821.000	.0006	.33	.33	140	67	65	257	250	45		12
1 6	10		CAL	.0006		.33	145	67	66	256	247	47		12
1 5	15			SUM										
1 5	20		826.53	.0010	.559	.56	141	72	67	255	247	45		11
1 4	25		828.86	.0010		.56	141	72	67	255	247	45		11
1 4	30			.0010		.56	144	74	68	255	247	48		10
1 3	35		Dry	Silicon		Gel								
1 3	40		835.85	.0010		.56	144	80	72	255	247	48		7
1 2	45		838.17	.0010		.56	144	80	72	256	247	48		7
1 2	50		8	.0010		.56	144	80	74	255	247	51		7
1 1	55		84246	.0011		.56	144	81	74	256	247	51		6
1 1	60	1038												
1 1	65		847.1	.0011		.56	145	81	75	256	247	55		5
1 1	70		849.065	.0011		.56	145	81	75	256	247	55		5
1 2	75			.0005		.28	145	81	75	257	247	55		5
1 2	80		852.	.0006		.28	145	81	76	257	247	57		3
1 3	85			.0005		.28	145	81	76	256	248	54		3
1 3	90													
1 4	95		857.66	.0003		.28	145	83	78	256	247	50		3
1 4	100		859.00	.0003		.23	145	83	78	256	247	50		3
1 5	105			.0002		.11	145	82	79	258	248	50		3
1 5	110													
1 6	115													
1 6	120	1138	862.838			.11	145							

Notes:

Field Data Sheet

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Client/Plant/Location: OSU/west Cyc

Date 12-18

Test Method 7

Concurrent Testing 25

Run # 13 cont

Operator DRB Support

Temperature, Amb (Ta) 42

Pressure, Bar (Pb) 30.4

Pressure, Static (Pstat) 0

Probe 3-1 Cp Heat Set 450

Pilot Pretest in in/min

Leak Check Post in in/min

Nozzle 488

Sample Box 2 Heat Set

Meter Box 4 dH@ Y

Meter Pretest cfm in/Hg

Leak Check Post 0.005 cfm 14 in/Hg

Filters 98M-206 98S-15

Stack Diagram

Cyclonic Flow ?

Moisture (8 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Leak Rate (Pump)	Dry Gas Meter Reading cuft (Vm)	Orifice Setting (dH)	Stack Pressure (dH) or Static	Velocity Pressure (dP) actual (dH)	Stack Temperature (Ts) Avg	Dry Gas Meter Temperature (Tm in) Avg	Dry Gas Meter Temperature (Tm out) Avg	Oven Temperature (Tp) Avg	Oven Filter Temperature (Tp) Avg	Impinger Outlet Temperature (Ti) Avg	Aux Temperature (Ta)	Pump Vacuum in/Hg (Pv)
		1145	862.838											
1 6	5		864.83	.0008	.449	.45	144	77	77	255	255	44		5
1 6	10		866.83	.0029		.45	144	77	77	255	255	44		5
1 5	15			.0010		.56	144	77	77	256	250	44		5
1 5	20		871.17	.0010		.56	144	76	76	256	250			5
1 4	25		873.33	.0010		.56	144	76	75	256	250	50		5
1 4	30		875.52	.0010		.56	144	76	75	255	250	51		5
1 3	35		877.64	.0010		.56	144	75	74	256	250	54		5
1 3	40		879.84	.0009		.45	144	76	74	256	250	58		5
1 2	45	1330	881.759	.0010		.56	144	76	74	256	250	58		5
10														
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25														

Notes:

Field Data Sheet

Date	12-18-98
Test Method	7
Concurrent Testing	25A
Run #	14 cyc2 East
Operator	DRB Support
Temperature, Amb (Ta)	40
Pressure, Bar (Pb)	30.4
Pressure, Static (Pstat)	0
Filters	49m-200 983-14

Client/Plant/Location: OSU/East/cyc2

Probe 3-2 Cp — Heat Set 250

Pitot	Pretest	in	in/min
Leak Check	Post	in	in/min

Nozzle .988"

Sample Box 1 — Heat Set 250

Meter Box 7 dH@ — Y

Meter	Pretest	0.005 cfm	16	in Hg
Leak Check	Post	cfm		in Hg

Moisture 18 — Tdb — Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time (min)	Clock Time (24 hr)	Dry Gas Meter Reading (Vm)	Velocity Head (inH2O)	Orifice Pressure Setting (dH@)	Stack Temperature (Ts) °F Actual	Stack Temperature (Ts) °F Target/Avg	Stack Temperature (Ts) °F Duct end	Impinger Exit (Tp) °F	Dry Gas Meter Inlet (Tm) °F	Dry Gas Meter Outlet (Td) °F	Aux (Ta) °F	Pump Vacuum Reading (Pv)
		1238	177.777										
1 6	5		Cal	.0003		.17		62	62	270	255	55		4
1 6	10													
1 5	15		181.66	.0005	28	.28	137	62	62	270	255	51		5
1 5	20		183.82	.0006	.334	.33	138	61	62	270	255	50		5
1 4	25		185.53	.0007	.389	.39	138	61	61	272	253	50		6
1 4	30		187.27	.0006		.39	139	64	62	270	250	49		6
1 3	35		189.12	.0006		.39	140	66	63	270	250			6
1 3	40		191.03	.0007		.39	142	67	63	272	250			6
1 2	45		192.46	.0006		.33	144	68	64	272	252	51		4
1 2	50		194.21	.0005		.28	144	69	65	270	250			4
1 1	55		195.62	.0005		.28	145	69	66	270	250	50		4
1 1	60	1338	197.0	.0006		.33	145	71	66	272	255	54		4
1 1	65		198.9	.0006		.33	145	71	68	272	250	51		4
1 1	70		200.95	.0006		.33	145	71	68	272	250	51		4
1 2	75		202.	.0002		.11	138	72	68	270	250	50		3
1 2	80		202.99	.0002		.11	138	71	69	273	251	49		3
1 3	85			.0002		.11	137	71	69	273	251	49		3
1 3	90													
1 4	95													
1 4	100		206.77	.0003										
1 5	105		207.75	.0002		.11	138	71	69	272	251	49		3
1 5	110		208.95	.0003		.17	139	71	69	270	250	49		3
1 6	115		210.28	.0003		.17	140	71	69	255	250	48		3
1 6	120	1438	211.650	.0003		.17	140	71	69	250	250	48		3
1														

Notes:

Field Data Sheet

[redacted] anron	[redacted] ngineering
Date	12-18-98
Test Method	7
Concurrent Testing	25A
Run #	14 cont
Operator	DBS Support
Temperature, Amb (Ta)	40
Pressure, Bar (Pb)	30.4
Pressure, Static (Pstat)	0
Filters	98mm 200 S-14

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location:	050/E Lagoon 2
Probe	3-2 Cp
Heat Set	250
Pilot Leak Check	Pretest in / Post in
Nozzle	.988
Sample Box	1
Heat Set	
Meter Box	7 dH@ Y
Meter Leak Check	Pretest cfm / Post .006 cfm 11
Moisture	18
Tdb	
Twb	

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head (delP) in H2O	Orifice Pressure (delH) in H2O or mm H2O	Vacuum (Actual) in Hg	Stack Temp °F (Ts) Avg:	Filter Temp °F (Tm-fb) Avg:	Probe Temp °F (Tm-out) Avg:	Impinger Temp °F (Tp) Avg:	Oven Temp °F (To) Avg:	Impinger Outlet °F (Ti) Avg:	Aux °F (Ta) Avg:	Pump Vacuum in Hg (Pv)
		1441	211.650											
1	6	5	.	.0003		.17								3
1	6	10	.											
1	5	15	.											
1	5	20	216.20	.0003		.17	146	69	69	270	250	50		3
1	4	25	217.49	.0003		.17	146	69	69	270	250	49		3
1	4	30	218.86	.0003		.17	146	70	69	270	250	50		3
1	3	35	.	.0002		.11	140	70	69	270	250	51		3
1	3	40	.											
1	2	45	.											
1	2	50	1531 222.770											
11			.											
12			.											
13			.											
14			.											
15			.											
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23			.											
24			.											

Notes:

Field Data Sheet

Horizon Engineering

Date 12-18-98
Test Method 7
Concurrent Testing 25A
Run # 15 west cyc 2
Operator DRS Support
Temperature, Amb (Ta) 42
Pressure, Bar (Pb) 30.4
Pressure, Static (Pstat) 0
Filters 98M-206, 983-15

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location: OSU/west/cyc 2
Probe 3-1 Cp Heat Set 250
Pitot Leak Check Pretest in in/ Post in in/
Nozzle .988
Sample Box 6 Heat Set 250
Meter Box 4 dH@ Y
Meter Leak Check Pretest 0.002 cfm 14 in Post cfm in
Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (dP)	Orifice Pressure Desired	Orifice Pressure Actual (dH)	Stack °F (Ts)	Meter Inlet °F (Tm in)	Meter Outlet °F (Tm out)	Probe °F (Tp)	Oven Filter °F (To)	Impinger Outlet °F (Ti)	Aux °F (Tx)	[illegible]
		1539	892.069											
1 6	5	1544	884	,0008	.471	,47	132	66	66	255	249	57		5
2 6	10	1549	885.97	,0008		,47	134	66	66	254	250	57		5
3 5	15	1554	887.78	.0007	.41	.41	134	66	66	254	249	55		4.0
4 5	20	1559	890.32	.0007	.41	.41	137	67	66	255	249	51		4.0
5 4	25	1604	892.12	.0008	.47	.47	138	70	66	255	250	50		4.0
6 4	30	1609	893.94	.0011	.65	.65	139	71	66	254	250	47		5.0
7 3	35	1614	895.86	.0008	.47	.47	142	71	66	256	250	47		4.0
8 3	40	1619	897.56	.0006	.35	.35	143	71	67	256	250	47		3.5
9 2	45	1624	899.79	.0010	.59	.59	143	72	67	256	257	46		5.0
10 2	50	1629	902.02	.0010	.59	.59	143	74	68	254	249	47		5.0
11 1	55	1634	904.28	.0010	.59	.59	143	75	69	254	249	47		5.0
12 1	60	1639	906.69	.0012	.71	.71	144	76	70	256	251	48		5.5
13 1	65	1644	909.06	.0011	.65	.65	144	77	70	255	250	50		5.5
14 1	70	1649	911.58	.0013	.77	.77	144	79	71	253	249	52		5.5
15 2	75	1654	913.96	.0011	.65	.65	144	80	72	254	249	54		5.5
16 2	80	1659	916.51	.0013	.77	.77	144	81	73	255	249	55		5.5
17 3	85	1704	919.06	.0013	.77	.77	144	82	75	256	249	58		5.5
18 3	90	1709	921.60	.0013	.77	.77	144	83	76	256	249	61		5.5
19 4	95	1714	923.95	.0011	.65	.65	145	84	77	256	250	62		5.0
20 4	100	1719	926.27	.0011	.65	.65	144	84	77	254	249	62		5.5
21 5	105	1724	928.55	.0010	.59	.59	144	84	77	254	250	63		5.0
22 5	110	1729	931.03	.0012	.71	.71	144	86	78	256	250	66		5.5
23 6	115	1734	933.52	.0012	.71	.71	145	85	80	255	250	67		5.5
24 6	120	1739	936.03	.0012	.71	.71	144	86	79	256	250	59		5.5
25														

Notes:

Field Data Sheet

Arizon Engineering

Date 12-18-98
Test Method ODEQ 7
Concurrent Testing EPA 25A
Run # 1 5
Operator JDF Support
Temperature, Amb (Ta) 35
Pressure, Bar (Pb) 30.4
Pressure, Static (Pstat) 0
Filters 98M-206, 985-15
Cyclonic Flow? No

Client/Plant/Location: OSU/West/Cycle 2
Probe 3-1 Cp Heat Set 250
Pitot Pretest in In/m
Leak Check Post in In/m
Nozzle .989
Sample Box 6 Heat Set 250
Meter Box 4 dH@ Y
Meter Pretest cfm In H
Leak Check Post .013 cfm 9 In H
Moisture 18 Tdb NA Twb NA

Stack Diagram

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (dP) in H2O	Orifice Pressure (dH) in H2O	Orifice Pressure (dH) in H2O @ Qstd	Stack Temp °F (Ts) Avg:	Meter Temp °F (Tm in / Tm out) Avg:	Meter Temp °F (Tm out) Avg:	Probe Temp °F (Tp) Avg:	Oven / Filter °F (To) Avg:	Impinger Outlet °F (Ti) Avg:	Aux °F (Ta)	Fan Vac in H2O (Pv)
1 1	125	1745	938.68	.0014	.83	.83	145	84	77	256	251	50		6.0
1	130	1750	941.05	.0011	.65	.65	145	84	78	254	250	49		5.0
2	135	1755	943.53	.0012	.71	.71	145	84	78	255	249	48		5.5
2	140	1800	946.09	.0013	.77	.77	145	84	78	255	249	47		5.5
3	145	1805	948.71	.0014	.83	.83	144	84	78	255	249	46		6.0
3	150	1810	951.34	.0014	.83	.83	144	84	78	256	249	47		6.0
4	155	1815	953.95	.0014	.83	.83	144	84	78	255	249	47		6.0
4	160	1820	956.09	.0009	.53	.53	144	84	79	254	249	47		4.5
5	165	1825	958.40	.0011	.65	.65	144	83	78	255	249	47		5.0
5	170	1830	960.61	.0009	.53	.53	145	83	78	254	250	46		4.5
6	175	1835	963.578	.0018	1.06	1.05	145	82	78	254	249	46		6.5
12														
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Notes:

Field Data Sheet

Orion Engineering

Client/Plant/Location: OSU / East / Cycle 2 / R16

Date 12-18-98

Test Method 7 ODEQ

Concurrent Testing 25A EPA

Run # 16 East Cycle 2

Operator JDF Support

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.4

Pressure, Static (Pstat)

Filters 98M-200 98S-14

Probe 3-2 Cp Heat Set 250

Pilot Pretest in in/m

Leak Check Post in in/m

Nozzle .988

Sample Box 1 Heat Set 250

Meter Box 7 dH@ Y

Meter Pretest .005 cfm 10 inH

Leak Check Post cfm inH

Moisture 18 Tdb NA Twb NA

Stack Diagram

Cyclonic Flow? NO

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH)	Delta P inH2O (dPt)	STACK °F (Ts) Amb:	AHEAD °F (Tm in) Amb:	BEHIND °F (Tm out) Amb:	FRONT °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Fan Vacuum inH2O (Pv)
		1840	224.673											
1	5	1845	.	.0013	.77	.77	117	66	66	273	254	50		5.5
1	10	1850	.											
2	15	1855	.	JUMPS										
2	20	1900	234.74											
3	25	1905	236.48	.0007	.41	.41	108	66	64	270	254	46		4.0
3	30	1910	237.48	.0002	.12	.12	138	66	64	272	254	46		2.5
4	35	1915	238.78	.0003	.18	.18	139	66	64	271	254	45		3.0
4	40	1920	240.08	.0003	.18	.18	140	66	64	270	252	46		3.0
5	45	1925	241.36	.0003	.18	.18	140	66	64	270	252	45		3.0
5	50	1930	242.31	.0002	.12	.12	140	66	64	272	254	46		2.5
6	55	1935	243.04	.0001	.06	.06	141	65	64	272	254	45		2.0
6	60	1940	244.48	.0004	.24	.24	142	65	64	272	254	46		3.5
6	65	1945	245.90	.0004	.24	.24	143	66	64	270	252	44		3.5
6	70	1950	247.15	.0003	.18	.18	144	66	64	270	254	44		3.0
5	75	1955	248.43	.0003	.18	.18	145	66	64	272	254	44		3.0
5	80	2000	249.88	.0004	.24	.24	145	66	64	272	251	44		3.0
4	85	2005	251.16	.0003	.18	.18	145	66	64	270	255	45		3.0
4	90	2010	252.67	.0004	.24	.24	145	66	65	273	252	44		3.0
3	95	2015	254.42	.0007	.41	.41	145	66	65	270	252	44		4.0
3	100	2020	255.45	.0002	.12	.12	144	66	65	270	252	46		2.5
2	105	2025	256.68	.0003	.18	.18	145	66	65	272	254	45		3.0
2	110	2030	257.67	.0002	.12	.12	145	66	65	272	251	44		2.5
1	115	2035	259.14	.0004	.24	.24	144	66	65	272	254	44		3.0
1	120	2040	258.31	.0002	.12	.12	144	66	65	270	254	45		2.5
			.											

Notes:

Field Data Sheet

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Date 12-18-98
Test Method OQEQ 7
Concurrent Testing EPA 25A
Run # 16
Operator SOF Support
Temperature, Amb (Ta) 35
Pressure, Bar (Pb) 30.4
Pressure, Static (Pstat) 0
Filters 98M-200, 985-14

Client/Plant/Location: OSU/East/Cycle 2
Probe 3-2 Cp Heat Set 250
Pilot Pretest in In/in
Leak Check Post in In/in
Nozzle .998
Sample Box / Heat Set
Meter Box 7 dH@ Y
Meter Pretest cfm In H
Leak Check Post .009 cfm 11.5 In H
Moisture 18 Tdb NA Twb NA

Stack Diagram
Cyclonic Flow? No

Traverse Point Number	Sampling Time min (θ)	Clock Time (Hr:Mn)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (ΔPv)	Orifice Pressure inH2O (ΔH)	Filter Pressure inH2O (ΔPf)	Stack Temp °F (Ts) Amb:	Probe °F (Tp) Amb:	Oven/Filter °F (To) Amb:	Impinger Outlet °F (Ti) Amb:	Aux °F (Tx)	Pump Vacuum inHg (Pv)
1	125	2047	261.41	.0004	.24	.24	145	66	65	271	252	44		3.0
1	130	2052	262.54	.0003	.18	.18	146	66	65	270	252	44		3.0
2	135	2057	263.54	.0002	.12	.12	146	66	65	272	251	45		2.5
2	140	2102	264.84	.0003	.18	.18	146	66	65	272	254	44		3.0
3	145	2107	266.18	.0003	.18	.18	146	66	65	272	253	45		3.0
* 3	150	2127	267.76	.0006	.35	.35	145	66	65	270	253	45		4.0
4	155	2132	268.53	.0001	.06	.06	138	64	63	270	254	45		2.0
4	160	2137	269.62	.0002	.12	.12	138	63	63	272	254	44		2.5
5	165	2142	270.85	.0003	.18	.18	144	63	63	270	251	45		3.0
5	170	2147	271.910	.0002	.12	.12	145	63	63	271	253	44		2.5
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														

Notes: Stop for hot check. Switch @ 2153

Field Data Sheet

Date 12-18-98
Test Method 0DEQ7
Concurrent Testing EPA 25A
Run # 17
Operator SDF Support
Temperature, Amt (Ta) 35
Pressure, Bar (Pb) 30.4
Pressure, Static (Pstat) 0
Filters 98M-706 / 985-15

Client/Plant/Location: OSU/West/Cycle 2
Probe 3-1 Cp Heat Set 250
Pilot Pretest in In/
Leak Check Post in In/
Nozzle, 986
Sample Box 6 Heat Set 250
Meter Box 4 dH@ Y
Meter Pretest .008 cfm 13 In
Leak Check Post cfm In
Moisture 18 Tdb NA Twb NA

Stack Diagram
Cyclonic Flow? NO

Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head ("H2O) (ΔPs)	Orifice Pressure Drop ("H2O) (ΔH)	Probe Temperature (°F) (Ts)	Stack Temperature (°F) (Ts)	Meter Box Inlet °F (Tm in)	Meter Box Outlet °F (Tm out)	Filter Temperature °F (Tf)	Oven Filter °F (To)	Impinger Outlet °F (Ti)	Aux °F (Ta)	Fo Vic In (F
		2155	963.817											
1	5	2200	968.11	.0033	1.95	1.95	119	58	57	257	251	43		16.0
1	10	2205	.	.0019	1.12	1.1	132	59	57	251	250	42		9.0
2	15	2210	974.10	SUM		BIAS.								
2	20	2215	977.01	.0017	1.0	1.0	136	64	58	249	251	47		8.0
3	25	2220	979.84	.0016	.94	.94	137	66	59	255	250	48		7.5
3	30	2225	982.69	.0016	.94	.94	137	68	60	256	250	49		7.5
4	35	2230	984.84	.0015	.88	.88	138	68	60	254	249	51		6.5
4	40	2235	988.25	.00017	1.0	1.0	141	70	62	254	250	55		7.5
5	45	2240	991.07	.0004	.24	.24	141	70	62	257	260	56		3.0
5	50	2245	992.80	.0008	.47	.47	141	69	62	256	250	56		4.5
6	55	2250	994.15	.0004	.24	.24	142	69	63	254	250	55		3.5
6	60	2255	995.87	.0006	.35	.35	142	67	63	255	250	54		4.0
6	65	2300	997.56	.0006	.35	.35	142	67	63	255	250	55		4.0
6	70	2305	999.01	.0005	.29	.29	142	68	63	255	251	56		3.5
5	75	2310	1000.43	.0004	.24	.24	143	68	63	256	250	55		3.0
5	80	2315	1002.35	.0005	.29	.29	143	68	64	254	250	53		3.5
4	85	2320	1005.18	.0016	.94	.94	142	69	64	255	249	53		6.0
4	90	2325	1008.09	.0017	1.0	1.0	140	71	65	252	250	57		7.0
3	95	2330	1011.01	.0017	1.0	1.0	139	72	65	254	250	61		7.0
3	100	2335	1013.63	.0014	.83	.83	140	73	66	254	248	63		6.0
2	105	2340	1016.27	.0014	.83	.83	140	73	66	255	250	63		6.5
2	110	2345	1018.93	.0015	.88	.88	139	73	66	244	250	65		7.0
1	115	2350	1021.40	.0012	.71	.71	139	72	66	244	249	64		6.5
1	120	2355	1023.029	.0014	.83	.83	139	72	66	255	250	63		7.0

Notes: Switched 25A probe over late: 2207 - missed ~ 13 minutes

Field Data Sheet

Arizon Engineering

Date	12-18-98
Test Method	ODEQ7
Concurrent Testing	EPA 25A
Run #	17
Operator	JK
Support	LDB
Temperature, Am (Ta)	30
Pressure, Bar (Pb)	30.4
Pressure, Static (Pstat)	0
Filters	98M-206 / 98S-15

Client/Plant/Location: OSU / West / Cycle 2

Probe	3-1	Cp		Heat Set	250
Pitot Leak Check	Pretest		in		in/m
	Post		in		in/m
Nozzle	.988				
Sample Box	6			Heat Set	250
Meter Box	4	dH@		Y	
Meter Leak Check	Pretest		cfm		inH
	Post	.013	cfm	17	inH
Moisture	18	Tdb	NA	Twb	NA

Stack Diagram

Cyclonic Flow? No

Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head in H2O (dP's)	Orifice Pressure in H2O Desired	Orifice Pressure in H2O Actual (dH)	Stack °F (Ts)	Meter Inlet/Avg °F (Tm in)	Meter Outlet °F (Tm out)	Probe °F (Tp)	Oven Filter °F (To)	Impinger Outlet °F (Ti)	Aux °F (Tx)	Pump Vacuum in Hg (Pv)
		1158	1023.079											
1 1	125		1026.62	.0013	.77	.77	136	70	66	254	248	61		7
2 1	130		— . —	.0013	.77	.77	136	71	66	251	249	62		7
3 2	135		1031.75	.0013	.77	.77	138	70	65	253	249	62		7
4 2	140		1033.95	.0010	.59	.59	137	70	63	253	249	62		6
5 3	145		1036.31	.0011	.65	.65	137	69	65	253	248	64		7
6 3	150		1038.80	.0012	.71	.71	138	69	64	257	249	58		7
7 4	155		1041.00	.0010	.59	.59	138	69	65	254	248	59		6
8 4	160		1043.55	.0013	.77	.77	138	68	64	253	249	59		7
9 5	165		1045.89	.0011	.65	.65	137	68	64	241	249	59		7
10 5	170	1248	1048.403	.0013	.77	.77	138	68	64	253	248	58		7
11 6	175													
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Arizon / ngineering

Client/Plant/Location: OSU / East / Cycle 2

Date 12-19-98

Test Method ODE a 7

Concurrent Testing EPA 25A

Run # 18

Operator CDB Support

Temperature, Amb (Ta) 30

Pressure, Bar (Pb) 30.4

Pressure, Static (Pstat) 0

Filters 98M-200, 98J-14

Probe 3-2 Cp Heat Set 250

Pilot Pretest in In/ml

Leak Check Post in In/ml

Nozzle .988

Sample Box 1 Heat Set 250

Meter Box 7 dH@ Y

Meter Pretest .007 cfm 12 InHg

Leak Check Post cfm InHg

Stack Diagram

Cyclonic Flow? NO

Moisture 18 Tdb NA Twb NA

Traverse Point Number	Sampling Time (Θ) min	Clock Time (24 hr)	Dry Gas Meter Reading (Vm) cu ft	Velocity Head (ΔPv) inH2O	Orifice Pressure (ΔH) inH2O	Orifice Pressure (ΔH) inH2O	Stack Temp °F (Ts) Amb:	Probe Temp °F (Tp) Actual	Filter Outlet °F (Tf out) Actual	Impinger Temp °F (Tp) Amb:	Oven Temp °F (To) Amb:	Impinger Outlet °F (Ti) Amb:	Aux °F (Ta)	Vacuum inHg (Pv)
		1257	272.100											
1 1	5		274.06	.0008	.47	.47	124	54	54	270	250	45		4
1 1	10			.0005	.29	.29	136	54	54	269	252	46		3
1 2	15		277.26	JUMP		6 ins								
1 2	20		278.53	.0003	.18	.18	138	54	54	269	252	49		3
1 3	25		279.79	.0003	.18	.18	139	55	54	269	251	49		3
1 3	30		281.06	.0003	.18	.18	139	55	54	270	254	48		3
1 4	35		282.64	.0005	.29	.29	139	56	54	270	255	49		4
1 4	40		284.07	.0004	.24	.24	143	57	54	270	250	50		2
1 5	45		285.52	.0004	.24	.24	145	57	55	269	254	51		3
11 5	50		286.64	.0002	.12	.12	145	57	55	270	255	51		2
11 6	55		287.76	.0002	.12	.12	145	57	55	270	252	51		2
11 6	60		288.87	.0002	.12	.12	145	58	55	270	252	51		2
11 6	65		290.17	.0003	.18	.18	144	58	55	270	252	51		3
11 6	70		292.36	.0009	.53	.53	145	58	56	269	252	54		4
11 5	75		293.89	.0005	.29	.29	145	58	56	269	252	55		3
11 5	80		294.99	.0002	.12	.12	146	58	56	269	251	52		2
11 4	85		296.42	.0004	.24	.24	145	58	56	270	253	52		3
11 4	90		297.70	.0003	.18	.18	146	58	56	269	253	53		3
11 3	95		298.77	.0002	.12	.12	146	58	56	271	252	54		2
11 3	100		300.05	.0003	.18	.18	146	58	56	270	253	54		3
11 2	105		301.11	.0002	.12	.12	146	58	56	270	254	54		2
11 2	110		302.15	.0002	.12	.12	146	58	56	271	252	52		2
11 1	115		303.18	.0002	.12	.12	146	58	57	271	254	52		2
11 1	120	257	304.267	.0002	.12	.12	146	58	57	271	254	52		2
11														

Notes:

Field Data Sheet

Orion Engineering

Date 12-17-98
Test Method ODEQ 7
Concurrent Testing EPA 25A
Run # 1B
Operator COB Support
Temperature, Am (Ta) 30
Pressure, Bar (Pb)
Pressure, Static (Pstat) 0
Filters 98M-200, 985-14

Client/Plant/Location: OSU/East/Cycle2
Probe 3-2 Cp Heat Set 250
Pitot Pretest in In/min
Leak Check Post in In/min
Nozzle .988
Sample Box 1 Heat Set 250
Meter Box 7 dH@ 4 Y
Meter Pretest cfm In Hg
Leak Check Post .005 cfm 6 In Hg
Moisture 18 Tdb NA Twb NA

Stack Diagram
Cyclonic Flow? NO

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O (dH)	Probe Pressure in H2O at Meter (dHt)	Stack Temp °F (Ts) Avg:	Meter Inlet °F (Tm in) Avg:	Meter Outlet °F (Tm out) Avg:	Probe °F (Tp) Avg:	Oven/Filter °F (To) Avg:	Impinger Outlet °F (Ti) Avg:	Aux °F (Ta)	Pump Vacuum in Hg (Ps)
		300	304.267											
1 1	125		305.65	.0003	.18	.18	139	58	57	270	251	44		4
1 1	130		307.03	.0003	.18	.18	139	58	57	269	251	49		4
1 2	135		308.25	.0003	.18	.18	146	58	57	269	252	49		4
1 2	140		309.29	.0002	.12	.12	146	58	57	270	251	47		3
1 3	145		310.35	.0002	.12	.12	147	58	57	270	251	45		3
1 3	150		—	.0002	.12	.12	147	58	57	270	252	44		3
1 4	155		312.44	.0002	.12	.12	149	58	57	270	249	45		3
1 4	160		313.75	.0003	.18	.18	149	59	57	270	252	45		3
1 5	165		315.05	.0003	.18	.18	150	58	57	270	251	46		3
10 5	170	350	316.357	.0003	.18	.18	150	58	57	270	252	47		3
11 6	175													
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU West Cyclone 2

Date 12/19/98
Test Method ODEQ 7
Concurrent Testing 25 A
Run # 19
Operator CDB Support
Temperature, Am (Ta) 20
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Probe 3-7 Cp Heat Set 250 °F
Pilot Pretest in in/min
Leak Check Post in in/min
Nozzle .988
Sample Box Heat Set 250 °F
Meter Box dH@ Y
Meter Pretest .01 cfm 15 inHg
Leak Check Post cfm inHg

Stack Diagram

Filters Cyclonic Flow ? Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		359	48.562											
1 1	5		51.52	.0010	.59	.59	131	50	50	254	249	44		12
2 1	10		— . —	.0010	.59	.59	142	51	50	253	249	47		11
3 2	15		56.05		JUMP									
4 2	20		58.43	.0012	.71	.71	148	54	50	254	248	52		11
5 3	25		60.78	.0011	.65	.65	149	55	50	253	248	54		9
6 3	30		63.11	.0011	.65	.65	150	57	51	252	248	54		9
7 4	35		65.48	.0011	.65	.65	152	58	52	252	248	60		9
8 4	40		67.68	.0010	.59	.59	154	59	52	253	249	61		8
9 5	45		69.99	.0011	.65	.65	156	59	53	252	248	63		9
10 5	50		72.20	.0010	.59	.59	158	60	54	254	247	65		8
11 6	55		74.35	.0010	.59	.59	159	60	54	253	249	66		8
12 6	60		76.47	.0010	.59	.59	160	61	56	253	248	65		8
13 6	65		78.75	.0011	.65	.65	161	63	56	253	248	66		9
14 6	70		81.06	.0011	.59	.59	162	64	57	244	248	68		9
15 5	75		83.40	.0011	.65	.65	163	64	58	253	248	60		8
16 5	80		85.75	.0011	.65	.65	164	65	58	254	248	53		8
17 4	85		88.19	.0012	.71	.71	165	65	59	246	249	46		9
18 4	90		90.05	.0007	.41	.41	166	64	57	253	249	43		6
19 3	95		92.44	.0012	.71	.71	166	63	57	255	249	42		9
20 3	100		94.54	.0009	.53	.53	166	64	58	255	249	44		7
21 2	105		— . —	.0010	.59	.5	166	64	58	255	249	45		8
22 2	110		99.07	.0011	.65	.65	166	65	59	255	248	47		9
23 1	115		101.37	.0011	.65	.65	166	65	59	255	249	46		9
24 1	120	559	103.86	.0013	.77	.77	166	65	59	254	249	49		10
25														

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU west Cyclone

Date: 12/19/98
Test Method: ODEQ 7
Concurrent Testing: 25A
Run #: 19
Operator: CDR Support
Temperature, Am (Ta): 30
Pressure, Bar (Pb): 30.44
Pressure, Static (Pstat): 0

Probe: 3-1 Cp: Heat Set: °F
Pitot: Pretest: in: in/min
Leak Check: Post: in: in/min
Nozzle: .928
Sample Box: Heat Set: °F
Meter Box: dH@: Y
Meter: Pretest: cfm: inHg
Leak Check: Post: .01 cfm: 14 inHg

Stack Diagram

Filters: Cyclonic Flow ?: Moisture: Tdb: Twb:

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		602	103.86											
1 1	5		105.41	.0005	.29	.29	162	63	60	257	250	48		11
2 1	10		106.65	.0003	.18	.18	162	64	60	256	249	52		9
3 2	15		108.03	.0004	.24	.24	163	63	60	256	249	53		9
4 2	20		109.44	.0004	.24	.24	163	64	60	256	249	51		9
5 3	25		110.84	.0004	.24	.24	163	64	60	257	250	55		9
6 3	30		112.25	.0004	.24	.24	164	64	61	257	249	57		9
7 4	35		113.67	.0004	.24	.24	165	64	61	256	25	55		9
8 4	40		114.87	.0003	.18	.18	166	65	61	256	249	57		8
9 5	45		116.07	.0003	.18	.18	166	64	61	256	250	59		8
10 5	50	652	117.047	.0002	.12	.12	166	64	62	257	250	59		7
11 6	55													
12 6	60													
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Last Run

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU East Cycle 2

Date 12/19/98
Test Method CDEG 7
Concurrent Testing 25#
Run # 20 Cyc 2
Operator CDB Support
Temperature, Amb (Ta) 3C
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0
Filters 98M-200 98S-14

Probe S-2 Cp Heat Set 250 °F
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle .988
Sample Box 1 Heat Set 250 °F
Meter Box 7 dH@ Y
Meter Pretest .015 cfm 15 inHg
Leak Check Post cfm inHg

Stack Diagram
Cyclonic Flow?
Moisture 30 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		657	316.532				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5		318.87	.0012	.71	.71	156	52	52	270	254	47		6
2 1	10		.	.0005	.29	.29	161	52	52	268	254	48		4
3 2	15		— . —											
4 2	20		322.67	.0003	.18	.18	165	53	52	271	256	55		6
5 3	25		323.73	.0002	.12	.12	155	53	52	272	254	52		5
6 3	30		324.75	.0002	.12	.12	153	54	52	272	254	46		5
7 4	35		326.01	.0003	.18	.18	148	54	52	272	255	45		6
8 4	40		327.05	.0002	.12	.12	153	54	53	270	254	46		5
9 5	45		328.07	.0002	.12	.12	146	55	54	272	255	51		5
10 5	50		329.06	.0002	.12	.12	150	55	54	270	254	49		5
11 6	55		330.36	.0002	.12	.12	147	55	54	272	255	46		5
12 6	60	757	331.65	.0003	.18	.18	144	55	54	267	254	46		7
13 6	65		332.82	.0003	.18	.18	144	56	54	271	255	48		7
14 6	70		.	.0002		.12	146	57	55	257	255	47		5
15 5	75		.											
16 5	80		.											
17 4	85		336.00	.0002		.12	145	61	58	273	255	46		5
18 4	90		337.27	.0002		.12	145	61	58	270	255	46		5
19 3	95		338.0	.0002		.12	150	61	58	272	254	45		5
20 3	100		338.9	.0002	.09	.10	164	63	60	269	254	43		5
21 2	105		340.04	.0003		.13	165	64	61	268	254	41		6
22 2	110		340.99	.0002	.09	.09	164	65	61	269	254	42		5
23 1	115		341.96	.0004		.17	165	66	63	268	254	41		7
24 1	120	857	343.29	.0004		.17	165	66	63	267	253	41		7
25			.											

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/East/Cyc 2

Date: 12-19-98
Test Method: 7
Concurrent Testing: 25A
Run #: 20017
Operator: DRB Support
Temperature, Amb (Ta): 30
Pressure, Bar (Pb): 30.3
Pressure, Static (Pstat): 0
Filters: 98M-200 5-14

Probe: 3-2 Cp — Heat Set: 250 °
Pitot: Pretest ___ in ___ in/min
Leak Check: Post 3.75 in 0.0 in/min
Nozzle: .188
Sample Box: 1 — Heat Set: ___ °
Meter Box: 7 dH@: ___ Y: ___
Meter: Pretest ___ cfm ___ inHg
Leak Check: Post 0.007 cfm 12 inHg

Stack Diagram

Cyclonic Flow? ___

Moisture: 30 Tdb: ___ Twb: ___

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		859	343.214				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 6	5		344.5	.0004		.18	164	69	66	267	256	46		7
2 6	10		345.7	.0004		.18	164	71	67	265	255	45		7
3 5	15		346.9	.0004		.18	164	72	69	264	252	45		7
4 5	20		348.23	.0004		.18	164	72	69	264	252	45		7
5 4	25		349.49	.0004		.18	166	72	69	265	253	45		7
6 4	30		350.54	.0003		.13	166	72	70	266	253	46		7
7 3	35		351.42	.0002	.009	.09	167	73	71	267	252	47		5
8 3	40	939	352.3	.0005	.209	.21	150	74	71	267	252	47		5
9 2	45		353.94	.0009		.38	153	74	72	267	250	46		10
10 2	50	949	355.811	.0009		.38	153	75	72	265	252	46		10
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU/Adeist/Cyc 2

Date: 12-19-98
Test Method: 7
Concurrent Testing: 25A
Run #: 21 West Cyc 2
Operator: DRB Support
Temperature, Amb (Ta): 30
Pressure, Bar (Pb): 30.3
Pressure, Static (Pstat): 0
Filters: 78M206 & 15

Probe: 3-1 Cp — Heat Set: 250
Pitot: Pretest ___ in ___ in/min
Leak Check: Post 4 in 0.0 in/min
Nozzle: 986
Sample Box: #6 — Heat Set: 250
Meter Box: 4 dH@ ___ Y
Meter: Pretest 0.011 cfm 15 inHg
Leak Check: Post 0.0 cfm 13 inHg

Stack Diagram
Cyclonic Flow?
Moisture: 30 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		955	117.167				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 6	5		118.47	.0007		.19	157	78	76	258	251	58		9
2 6	10		120.17	.0007		.29	162	79	76	257	251	51		8
3 5	15		.	.0006		.25	162	80	77	257	251	46		7
4 5	20		123.38	.0005		.23	163	82	79	258	250	46		6
5 4	25		124.72	.0005		.23	163	82	79	258	251	50		6
6 4	30		.	.0006		.25	163	84	80	258	251	52		5
7 3	35		127.72	.0006										
8 3	40		128.72	.0004		.17	163	85	83	258	250	52		4
9 2	45		129.999	.0006		.25	163	86	83	258	249	54		5
10 2	50		1313.99	.0006		.25	163	86	83	258	241	54		5
11 1	55		132.86	.0006		.25	164	85	83	257	250	55		4
12 1	60	1055	134.49	.0008	.338	.34	164	84	83	255	251	53		5
13 1	65		135.98	.0007		.30	165	83	82	257	250	50		5
14 1	70		137.999	.0007		.30	165	82	82	257	250	54		5
15 2	75		139.15	.0007		.30	165	81	81	256	250	54		5
16 2	80	1115	140.221	.0007		.30	161	79	79	250	250	49		
17 3	85		.											
18 3	90	HLT	.											
19			.											
20			.											
21			.											
22			.											
23			.											
24			.											
25			.											

Notes:

Blank Correction

Willamette Industries - OSU						14-Dec-98
Kiln Test No. 2 Cycle No. 1 Douglas Fir						drb
Corvalis, OR						part_gas
EPA 1-4, ODEQ 5						mew
BLANKS						
Acetone	126	ml	0.0016	gm	1.27	mg/100ml
H2O, Residue	358	ml	-0.0003	gm	-0.08	mg/100ml
H2O, DCM	358	ml	-0.0001	gm	-0.03	mg/100ml
Filter-Front	m98-196	ID	-0.0001	gm		
Filter-Back	s98-5x	ID	0.0001	gm		

RUNS			West	East	Total
ACETONE-Front	Volume	ml	112	148	
	Weight	mg	3.4	9.8	
	Blank	mg/100ml	1.00	1.00	
	Correction	mg	-1.12	-1.48	
	Net	mg	2.28	8.32	10.60
ACETONE-Back	Volume	ml	186	322	
	Weight	mg	19.6	22.7	
	Blank	mg/100ml	1.00	1.00	
	Correction	mg	-1.86	-3.22	
	Net	mg	17.74	19.48	37.22
IMP WATER-Residue	Volume	ml	200	200	
	Weight	mg	6.40	5.70	
	Blank	mg/100ml	0.00	0.00	
	Correction	mg	0.00	0.00	
	Net	mg	6.40	5.70	12.10
IMP WATER-Extract (DCM)	Volume	ml	200	200	
	Weight	mg	14.50	10.60	
	Blank	mg/100ml	0.00	0.00	
	Correction	mg	0.00	0.00	
	Net	mg	14.50	10.60	25.10
FILTER-Front	ID		m98-283	*m98-250*	
	Weight	mg	15.70	*1.90*	17.60
FILTER-Back	ID		s98-51	s98-52	
	Weight	mg	5.20	0.50	5.70
FRONT HALF TOTAL		mg	17.98	10.22	28.20
BACK HALF TOTAL		mg	43.84	36.28	80.12
TOTAL	mn	mg	61.82	46.50	108.32
PERCENT BACK HALF		%	70.9%	78.0%	74.0%

Filter m98-250 was shredded on edge

Blank Correction

Willamette Industries - OSU					16-Dec-98
Kiln Test No. 2 Cycle No. 2 Douglas Fir					drb
Corvalis, OR					part_gas
EPA 1-4, ODEQ 5					mew
BLANKS					
Acetone	126	ml	0.0016 gm	1.27	mg/100ml
H2O, Residue	358	ml	-0.0003 gm	-0.08	mg/100ml
H2O, DCM	358	ml	-0.0001 gm	-0.03	mg/100ml
Filter-Front	m98-196	ID	-0.0001 gm		
Filter-Back	s98-5x	ID	0.0001 gm		

RUNS			West	East	Total
ACETONE-Front	Volume	ml	95	74	
	Weight	mg	2.7	3.6	
	Blank	mg/100ml	1.00	1.00	
	Correction	mg	-0.95	-0.74	
	Net	mg	1.75	2.86	4.61
ACETONE-Back	Volume	ml	222	214	
	Weight	mg	20.8	20.5	
	Blank	mg/100ml	1.00	1.00	
	Correction	mg	-2.22	-2.14	
	Net	mg	18.58	18.36	36.94
IMP WATER-Residue	Volume	ml	200	200	
	Weight	mg	12.30	11.00	
	Blank	mg/100ml	0.00	0.00	
	Correction	mg	0.00	0.00	
	Net	mg	12.30	11.00	23.30
IMP WATER-Extract (DCM)	Volume	ml	200	200	
	Weight	mg	13.20	8.50	
	Blank	mg/100ml	0.00	0.00	
	Correction	mg	0.00	0.00	
	Net	mg	13.20	8.50	21.70
FILTER-Front	ID		m98-206	m98-200	
	Weight	mg	33.70	5.10	38.80
FILTER-Back	ID		s98-15	s98-14	
	Weight	mg	-0.40	0.50	0.10
FRONT HALF TOTAL		mg	35.45	7.96	43.41
BACK HALF TOTAL		mg	43.68	38.36	82.04
TOTAL	mn	mg	79.13	46.32	125.45
PERCENT BACK HALF		%	55.2%	82.8%	65.4%

ANTECH

Analysis/Technology

Mr. David Rossman
HORIZON ENGINEERING
13585 NE Whitaker
Portland, OR 97230

January 15, 1999 Identification: OSU/Willamette Industries
Job # 9835500-48 Date received: 12/22/98

Sample #	35506-09	35510-13	35513-14	35515-16	35517-19	35520-21
Identification:	OSU west cycle 1 R 1,3,5,7	OSU west cycle 1 R 9,11,13	OSU west cycle 1 R 15,17	OSU west cycle 1 R19,21	OSU west cycle 2 R 3,5,7	OSU west cycle 2 R 9,11
Impinger water:						
volume (mls)	989	965	760	808	980	800
residue (g)	0.0017	0.0024	0.0015	0.0008	0.0043	0.0033
DCM:						
volume (mls)	150	150	150	150	150	150
residue (g)	0.0040	0.0038	0.0014	0.0053	0.0036	0.0035

Sample #	35522-24	35525-26	35527-29	35530-32	35533-35	35536
Identification:	OSU west cycle 2 R 13,15,17	OSU west cycle 2 R 19,21	OSU east cycle 1 R 2,4,6	OSU east cycle 1 R 8,10,12	OSU east cycle 1 R 14,16,18	OSU east cycle12 R 20
Impinger water:						
volume (mls)	985	1050	758	825	905	562
residue (g)	0.0024	0.0023	0.0022	0.0016	0.0016	0.0003
DCM:						
volume (mls)	150	150	150	150	150	150
residue (g)	0.0042	0.0019	0.0042	0.0017	0.0013	0.0034

Sample #	35537-39	35540-42	35543-45	35546-16	35547	35548
Identification:	OSU east cycle 2 R 2,4,6	OSU east cycle 2 R 8,10,12	OSU east cycle 2 R 14,16,18	OSUeastt cycle 2 R 20	OSU cycle 1 blank	OSU cycle 2 blank
Impinger water:						
volume (mls)	764	853	604	559	358	340
residue (g)	0.0012	0.0011	0.0007	0.0008	-0.0003	0.0001
DCM:						
volume (mls)	150	150	150	150	150	150
residue (g)	0.0020	0.0009	0.0027	0.0029	-0.0001	-0.0003

Respectfully submitted:
ANTECH

Diana Tracy, president

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ANTECH

Analysis/Technology

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Portland, OR 97230

January 15, 1999 — Identification: OSU/Willamette Industries
Job # 9835500-48 — Date received: 12/22/98

Sample #	35500	35501	35502
Identification:	Kiln East Cycle 1 Run 1	Kiln East Cycle 2 Run 2	Kiln East Blank Run 3
Front acetone:			
volume (mls)	148	74	126
residue (g)	0.0098	0.0036	0.0016
Back acetone:			
volume (mls)	322	214	
residue (g)	0.0277	0.0205	
Filters:			
number	8M-250	98M-200	
residue (g):	0.0019*	0.0051	
Filters:			
number	98S-52	98S-14	
residue (g)	0.0005	0.0005	

*note: Filter 98M-.250 edge of filter was shredded.

Respectfully submitted:
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Portland, OR 97230

January 15, 1999 Identification: OSU/Willamette Industries
Job # 9835500-48 Date received: 12/22/98

Sample #	35503	35504	35505
Identification:	Kiln West Cycle 1 Run 1	Kiln West Cycle 2 Run 2	Kiln West Blank Run 3
Front acetone:			
volume (mls)	112	95	115
residue (g)	0.0034	0.0027	0.0017
Back acetone:			
volume (mls)	186	222	
residue (g)	0.0196	0.0208	
Filters:			
number	98M-283	98M-2206	98M-196
residue (g):	0.0157	0.0337	-0.0001
Filters:			
number	98S-51	98S-15	98S-57
residue (g)	0.0052	-0.0004	0.0001

Respectfully submitted:
ANTECH

Diana Tracy
president

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12-26 70°/56° 10A
12-27 72°/51° 9AM
12-28 71°/62° 8AM

SAMPLE DATA: EPA RESIDUES
analyst: lw reviewer: _____
Job # 355 Identification: OSU/Wallamette Industries - j# 1077

FAXED 12-30-98

FRONT ACETONE:	date gross 1: _____			date gross 2: _____	
Sample #	35500	35501	35502		
sample ID	OSU E cycle 1	OSU E cycle 2	OSU cycle 1		
cont. #			Blank		
vol mark (check if OK)	✓	✓	✓		
volume(ml)	148 ml	74 ml	126 ml		
gross1(g)	118.8229	106.7486	88.3635	12-27	
gross2(g)	118.8231	106.7490	88.3640	12-28	
average gross(g)*	118.8230	106.7488	88.3638		
tare(g)	118.8132	106.7452	88.3622		
residue(g)	.0098	.0036	.0016		

BACK ACETONE:	date gross 1: _____			date gross 2: _____	
Sample #	35500	35501			
sample ID	OSU E cycle 1	OSU E cycle 2			
cont. #					
vol mark (check if OK)	✓	✓			
volume(ml)	322 ml	214 ml			
gross1(g)	107.3830	107.7184		12-27	
gross2(g)	107.3835	107.7192		12-28	
		107.7196 12-29			
average gross(g)*	107.3833	107.7194			
tare(g)	107.3606	107.6989			
residue(g)	.0227	.0205			

IMPINGER WATER:	date gross 1: _____			date gross 2: _____	
Sample #					
sample ID					
cont. #					
vol mark (check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

revised copy 2/10/99

SAMPLE DATA: EPA RESIDUES

analyst: MW reviewer: _____
Job # 355 Identification: OSU/Williamette Industries #1079

DCM: date gross 1: _____ date gross 2: _____

Sample #					
sample ID					
cont. #					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

FILTERS: date gross 1: 1 date gross 2: _____

Sample #	35500	35500	35501	35501	
sample ID	OSU E Cycle 1	OSU E Cycle 1	OSU G Cycle 2	OSU E Cycle 2	
Filter #	98M-250	98S-52	98M-300	98S-14	
gross1(g)	.4172	.2045	.4240	.2527 12/27 / 12-23	
gross2(g)	.4166	.2043	.4202	.2529 12/27 / 12-27	
average gross(g)*	.4184 12-28 / .4179 12-29 / .4182	.2044	.4155 12-28 / .4158 12-29 / .4157	.2528	
tare(g)	.4163	.2039	.4106	.2523	
residue(g)	.0019 *	.0005	.0051	.0005	

Temperature day 1 _____ Humidity day 1 _____

Temperature day 2 _____ Humidity day 2 _____

NBS thermometer # _____

Balance service date: _____

* edge of filter was shredded. - MW

12-23 70°/56° 10Am
12-27 72°/61° 9Am
12-28 71°/62° 8Am

SAMPLE DATA: EPA RESIDUES
analyst: _____ reviewer: _____
Job # 355 Identification: OSU/Willamette Industries # 1079.

FAXED 12-30-98

FRONT ACETONE:	date gross 1: _____			date gross 2: _____	
Sample #	35503	35504	35505		
sample ID	OSU W cycle 1	OSU W cycle 2	OSU W cycle 2 Blank		
cont. #					
vol mark (check if OK)	✓	✓	✓		
volume(ml)	112 ml.	95 ml.	115 ml.		
gross1(g)	102.3482	102.3748	101.6702	12-27	
gross2(g)	102.3483	102.3750	101.6706	12-28	
average gross(g)*	102.3483	102.3749	101.6704		
tare(g)	102.3449	102.3722	101.6687		
residue(g)	.0034	.0027	.0017		

BACK ACETONE:	date gross 1: _____			date gross 2: _____	
Sample #	35503	35504			355
sample ID	OSU W cycle 1	OSU W cycle 2			Blank 12-23-98
cont. #					
vol mark (check if OK)	✓	✓			
volume(ml)	186 ml.	222 ml.			empty
gross1(g)	125.5244	109.2527			116.9070 12-27
gross2(g)	125.5246	109.2527			116.9072 12-28
average gross(g)*	125.5245	109.2527			116.9071
tare(g)	125.5049	109.2319			116.9070
residue(g)	.0196	.0208			.0001

IMPINGER WATER:	date gross 1: _____			date gross 2: _____	
Sample #					
sample ID					
cont. #					
vol mark (check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

SAMPLE DATA: EPA RESIDUES

analyst: lw reviewer:
Job # 355 Identification: OSU / Willamette Industries #1079

DCM: date gross 1:_____ date gross 2:_____

Sample #					
sample ID					
cont. #					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

FILTERS: date gross 1:_____ date gross 2:_____

Sample #	35503	35503	35504	35504	35505	35505	
sample ID	OSU W	OSU W	OSU W	OSU W	OSU	OSU	
	cycle 1	cycle 1	cycle 2	cycle 2	Blank	Blank	
Filter #	98M-283	98S-51	98M-206	98S-15	98M-196	98S-57	
gross1(g)	.4287	.2089 10-27	.4457	.2498	.4149	.2027	12-23
gross2(g)	.4289	.2090 10-28	.4456	.2498	.4152	.2027	12-27
average gross(g)*	.4288	.2090	.4457	.2498	.4151	.2027	
tare(g)	.4131	.2038	.4120	.2502	.4152	.2026	
residue(g)	.0157	.0052	.0337	-.0004	-.0001	.0001	

Temperature day 1_____ Humidity day 1_____

Temperature day 2_____ Humidity day 2_____

NBS thermometer # _____

Balance service date:_____

Balance calibration data (certified weights):

1-1-99 74°/60° TA
1-4-99 73°/61 trace
1-5-99 69°/59° 8AM
1-6-99 70°/64° 8AM
1-7-99 72°/60° 8AM

SAMPLE DATA: EPA RESIDUES
analyst: MW reviewer: _____
Job # 355 Identification: OSU/Tillamuttle Ind # 1079

FAXED 1-7-99

FRONT ACETONE:	date gross 1:			date gross 2:	
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

BACK ACETONE:	date gross 1:			date gross 2:	
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

IMPINGER WATER:	date gross 1:			date gross 2:	
Sample #	35506-09	35510-12	35513-14	35515-16	
sample ID	OSU W C1, R1,3,5,7	OSU W C1, R9,11,13	OSU W C1 R15,17	OSU W C1 R19,21	
cont. #					
vol mark					
(check if OK)					
volume(ml)	989ml	965ml.	760ml	808ml.	
gross1(g)	137.1781	133.4581	135.7782	131.9099	1-4
gross2(g)	137.1769	133.4571	136.7771	131.9087	1-5
	137.1783	133.4583	135.7780	131.9092	1-6
	137.1782	133.4578	135.7777 1-7		
average	137.1783	133.4581	135.7779	131.9090	
gross(g)*					
tare(g)	137.1766	133.4557	135.7764	131.9082	
residue(g)	.0017	.0024	.0015	.0008	

SAMPLE DATA: EPA RESIDUES

analyst: mj reviewer: _____
Job # 355 Identification: OSU/Willamette Dred, #1079

DCM: date gross 1: _____ date gross 2: _____

Sample #	35506-09	35510-12	35513-14	35515-16	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
cont. #	_____	_____	_____	_____	_____
volume(ml)	(150)	(150)	(150)	(150)	_____
gross1(g)	107.4233	112.0114	86.7049	88.6956	_____ 1-1
gross2(g)	107.4246	112.0122	86.7057	88.6969	_____ 1-4
	107.4247	112.0122	86.7055	88.6969	1-5
average gross(g)*	107.4247	112.0122	86.7056	88.6969	_____
tare(g)	107.4207	112.0084	86.7042	88.6916	_____
residue(g)	.0040	.0038	.0014	.0053	_____

FILTERS: date gross 1: _____ date gross 2: _____

Sample #	_____	_____	_____	_____	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Filter #	_____	_____	_____	_____	_____
gross1(g)	_____	_____	_____	_____	_____
gross2(g)	_____	_____	_____	_____	_____
average gross(g)*	_____	_____	_____	_____	_____
tare(g)	_____	_____	_____	_____	_____
residue(g)	_____	_____	_____	_____	_____

Temperature day 1 _____ Humidity day 1 _____

Temperature day 2 _____ Humidity day 2 _____

NBS thermometer # _____

Balance service date: _____

Balance calibration data (certified weights):

SAMPLE DATA: EPA RESIDUES

analyst: MW reviewer: _____
Job # 355 Identification: OSU/Tillamook Ind, #1079

DCM: date gross 1: _____ date gross 2: _____

Sample #	35517-19	35520-21	35522-24	35525-26	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
cont. #	_____	_____	_____	_____	_____
volume(ml)	(150)	(150)	(150)	(150)	_____
gross1(g)	109.8100	87.5127	102.2848	86.6558	1-1
gross2(g)	109.8104	87.5129	102.2850	86.6579 / 86.4569 1-5	1-4
average gross(g)*	109.8102	87.5128	102.2849	86.6569	_____
tare(g)	109.80666	87.5093	102.2807	86.6550	_____
residue(g)	.0036	.0035	.0042	.0019	_____

FILTERS: date gross 1: _____ date gross 2: _____

Sample #	_____	_____	_____	_____	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Filter #	_____	_____	_____	_____	_____
gross1(g)	_____	_____	_____	_____	_____
gross2(g)	_____	_____	_____	_____	_____
average gross(g)*	_____	_____	_____	_____	_____
tare(g)	_____	_____	_____	_____	_____
residue(g)	_____	_____	_____	_____	_____

Temperature day 1 _____ Humidity day 1 _____

Temperature day 2 _____ Humidity day 2 _____

NBS thermometer # _____

Balance service date: _____

Balance calibration data (certified weights):

SAMPLE DATA: EPA RESIDUES
analyst: WJ reviewer:
Job # 355 Identification: OSU/Willamette, Ind, #1079

FRONT ACETONE:	date gross 1:			date gross 2:	
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

BACK ACETONE:	date gross 1:			date gross 2:	
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

IMPINGER WATER:	date gross 1:			date gross 2:	
Sample #	35517-19	35520-21	35523-24	35525-26	
sample ID	OSU W C2 R3,5,7	OSU W C2 R9,11	OSU W C2 R13,15,17	OSU W C2 R19,21	
cont. #					
vol mark					
(check if OK)					
volume(ml)	980ml	800ml.	985ml.	1050ml	
gross1(g)	127.4371	134.7663	133.3232	132.5836	1-4
gross2(g)	127.4366	134.7652 134.7656 1-6	133.3228	132.5830 132.5825 1-6	1-5
average gross(g)*	127.4369	134.7654	133.3230	132.5828	
tare(g)	127.4326	134.7621	133.3200	132.5805	
residue(g)	.0043	.0033	.0024	.0023	

SAMPLE DATA: EPA RESIDUES
analyst: MW reviewer: _____
Job # 355 Identification: OSU/Tillamook Ind, #1079

FRONT ACETONE:	date gross 1:		date gross 2:		
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

BACK ACETONE:	date gross 1:		date gross 2:		
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

IMPINGER WATER:	date gross 1:		date gross 2:		
Sample #	35527-29	35530-32	35533-35	35536	
sample ID	OSU E Cl R2,4,6	OSU E Cl R8,10,12	OSU E Cl R 14,16,18	OSU E Cl R20	
cont. #					
vol mark					
(check if OK)					
volume(ml)	758ml.	825ml.	905ml.	562ml.	
gross1(g)	125.0816	163.1682	141.1144	126.9868	1-4
gross2(g)	125.0806 125.0813 1-6 125.0811 1-7	163.1683	141.1142	126.9865	1-5
average gross(g)*	125.0812	163.1683	141.1143	126.9867	
tare(g)	125.0790	163.1667	141.1127	126.9864	
residue(g)	.0022	.0016	.0016	.0003	

SAMPLE DATA: EPA RESIDUES

analyst: MD reviewer: _____
Job # 355 Identification: OSU/Willamette Ind, #1079

DCM: date gross 1: _____ date gross 2: _____

Sample #	35527-29	35530-32	35533-35	35536	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
cont. #	_____	_____	_____	_____	_____
volume(ml)	(150)	(150)	(150)	(150)	_____
gross1(g)	107.9388	117.3906	118.6638	117.2968	1-1
gross2(g)	107.9395	117.3907	118.6638	117.2967	1-4
	107.93916 1-5				
average gross(g)*	107.9396	117.3907	118.6638	117.2968	_____
tare(g)	107.9354	117.3890	118.6625	117.2934	_____
residue(g)	.0042	.0017	.0013	.0034	_____

FILTERS: date gross 1: _____ date gross 2: _____

Sample #	_____	_____	_____	_____	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Filter #	_____	_____	_____	_____	_____
gross1(g)	_____	_____	_____	_____	_____
gross2(g)	_____	_____	_____	_____	_____
average gross(g)*	_____	_____	_____	_____	_____
tare(g)	_____	_____	_____	_____	_____
residue(g)	_____	_____	_____	_____	_____

Temperature day 1 _____ Humidity day 1 _____

Temperature day 2 _____ Humidity day 2 _____

NBS thermometer # _____

Balance service date: _____

Balance calibration data (certified weights):

SAMPLE DATA: EPA RESIDUES
analyst: ___ reviewer: ___
Job # 355 Identification: OSU/Wilsonville Rd, #1079

FRONT ACETONE:	date gross 1:		date gross 2:		
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

BACK ACETONE:	date gross 1:		date gross 2:		
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

IMPINGER WATER:	date gross 1:			date gross 2:	
Sample #	35537-39	35540-42	35543-45	35546	
sample ID	OSU E C2 R2,4,6	OSU E C2 R8,10,12	OSU E C2 R14,16,18	OSU E C2 R20	
cont. #					
vol mark					
(check if OK)					
volume(ml)	764 ml	853 ml	604 ml	559 ml	
gross1(g)	126.5039	170.0886	142.9927	120.7003	1-4
gross2(g)	126.5028	170.0882	142.9921	120.6993	1-5
	126.5038		142.9930	120.6997	1-6
	126.5038		142.9925		1-7
average gross(g)*	126.5038	170.0884	142.9928	120.6995	
tare(g)	126.5026	170.0873	142.9921	120.6987	
residue(g)	.0012	.0011	.0007	.0008	

SAMPLE DATA: EPA RESIDUES

analyst: MW reviewer: _____
Job # 355 Identification: OSU/Willamette Ind, #1079

DCM: date gross 1: _____ date gross 2: _____

Sample #	35537-39	35540-42	35543-45	35546	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
cont. #	_____	_____	_____	_____	_____
volume(ml)	(150)	(150)	(150)	(150)	_____
gross1(g)	119.2084	118.5927	116.1521	115.7566	1-1
gross2(g)	119.2096 119.2097 1-5	118.5931	116.1525	115.7568	1-4
average gross(g)*	119.2097	118.5929	116.1523	115.7567	_____
tare(g)	119.2077	118.5920	116.1496	115.7538	_____
residue(g)	.0020	.0009	.0027	.0029	_____

FILTERS: date gross 1: _____ date gross 2: _____

Sample #	_____	_____	_____	_____	_____
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
Filter #	_____	_____	_____	_____	_____
gross1(g)	_____	_____	_____	_____	_____
gross2(g)	_____	_____	_____	_____	_____
average gross(g)*	_____	_____	_____	_____	_____
tare(g)	_____	_____	_____	_____	_____
residue(g)	_____	_____	_____	_____	_____

Temperature day 1 _____ Humidity day 1 _____

Temperature day 2 _____ Humidity day 2 _____

NBS thermometer # _____

Balance service date: _____

Balance calibration data (certified weights):

SAMPLE DATA: EPA RESIDUES
analyst: [illegible] reviewer: [illegible]
Job # 355 Identification: OSU/Willamette Ind, #1079

FRONT ACETONE:	date gross 1:			date gross 2:	
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

BACK ACETONE:	date gross 1:			date gross 2:	
Sample #					
sample ID					
cont. #					
vol mark					
(check if OK)					
volume(ml)					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

IMPINGER WATER:	date gross 1:			date gross 2:	
Sample #	35547	35548			3555B
sample ID	OSU C1 Blank	OSU C2 Blank			Blank 12-30-98
cont. #					
vol mark					
(check if OK)					
volume(ml)	358 ml.	340 ml.			empty
gross1(g)	166.6288	128.2209	1-4		117.2376 1-1
gross2(g)	166.6278 166.62831-6	128.2226	1-5		117.2381 1-4
average gross(g)*	166.6281	128.2228			117.2379
tare(g)	166.6284	128.2227			117.2378
residue(g)	-.0003	.0001			.0001

SAMPLE DATA: EPA RESIDUES

analyst: [illegible] reviewer: _____
Job # 355 Identification: OSU/Willamette Ind. #1079

DCM: date gross 1: _____ date gross 2: _____

Sample #	35547	35548			
sample ID					
cont. #					
volume(ml)	(600)	(600)			
gross1(g)	116.4720	119.8366	1-4		
gross2(g)	116.4718	119.8366	1-5		
average gross(g)*	116.4719	119.8366			
tare(g)	116.4720	119.8369			
residue(g)	-.0001	-.0003			

FILTERS: date gross 1: _____ date gross 2: _____

Sample #					
sample ID					
Filter #					
gross1(g)					
gross2(g)					
average gross(g)*					
tare(g)					
residue(g)					

Temperature day 1 _____ Humidity day 1 _____

Temperature day 2 _____ Humidity day 2 _____

NBS thermometer # _____

Balance service date: _____

Balance calibration data (certified weights):

Moisture Catch

Willamette Industries - OSU
Kiln Test No. 2 Cycle No. 1 Douglas Fir
Corvalis, OR
EPA 4

14-Dec-98
drb
part_gas
mew

			1	2	3	4	5	6	7	8	9	10	11
Impinger No. 1	Initial	g	850	678	852	690	849	653	848	684	822	676	858
	Final	g	882	876	1161	949	1130	905	1092	920	1111	923	1165
Impinger No. 2	Initial	g	752	691	736	678	739	663	748	683	761	690	743
	Final	g	773	697	763	697	764	683	761	705	773	702	767
Impinger No. 3	Initial	g	732	595	733	595	732	592	731	594	731	596	733
	Final	g	736	595	737	595	738	599	734	598	735	598	734
Silica Gel Impinger	Initial	g	550	524	571	537	520	507	513	530	519	540	528
	Final	g	568	537	588	548	534	523	523	540	525	550	543
Vlc	Net Moisture Gain	ml	75.1	217.4	357.6	289.5	326.6	295.5	270.5	272.5	311.6	271.5	347.6

			12	13	14	15	16	17	18	19	20	21
Impinger No. 1	Initial	g	677	846	674	805	689	826	664	810	703	848
	Final	g	941	1078	907	1117	928	1153	973	1150	974	959
Impinger No. 2	Initial	g	684	746	686	748	706	760	691	748	650	752
	Final	g	714	813	706	797	714	833	770	881	748	799
Impinger No. 3	Initial	g	597	732	594	732	595	735	595	735	595	732
	Final	g	599	745	600	745	598	738	597	737	600	745
Silica Gel Impinger	Initial	g	517	536	507	516	522	533	531	528	515	532
	Final	g	529	547	516	532	531	547	539	539	524	540
Vlc	Net Moisture Gain	ml	308.5	323.6	268.5	390.7	259.5	417.7	398.7	486.9	383.7	179.3

Moisture Catch

Willamette Industries - OSU
Kiln Test No. 2 Cycle No. 2 Douglas Fir
Corvalis, OR
EPA 4

16-Dec-98
drb
part_gas
mew

			1	2	3	4	5	6	7	8	9	10	11
Impinger No. 1	Initial	g	666	831	677	810	670	825	695	820	654	801	668
	Final	g	677	1016	885	1072	965	1110	1015	1123	1007	1028	959
Impinger No. 2	Initial	g	697	689	710	697	693	693	679	703	702	700	687
	Final	g	710	697	720	707	711	703	822	721	766	712	772
Impinger No. 3	Initial	g	569	755	569	757	573	757	576	757	571	755	571
	Final	g	569	757	573	757	576	759	579	761	579	758	578
Silica Gel Impinger	Initial	g	522	524	522	522	536	533	510	525	522	523	533
	Final	g	533	535	530	533	550	543	531	539	544	532	555
Vlc	Net Moisture Gain	ml	35.1	206.4	230.4	283.5	330.6	307.5	487.9	339.6	447.8	251.4	405.7

			12	13	14	15	16	17	18	19	20	21
Impinger No. 1	Initial	g	810	667	836	662	821	691	810	655	811	648
	Final	g	1059	928	1016	967	1011	969	987	1047	1121	879
Impinger No. 2	Initial	g	689	694	666	687	672	695	679	696	667	672
	Final	g	697	705	672	732	679	755	691	927	766	679
Impinger No. 3	Initial	g	756	572	756	573	756	572	757	571	756	570
	Final	g	756	573	757	575	757	588	759	586	758	572
Silica Gel Impinger	Initial	g	538	536	546	524	503	519	522	532	535	500
	Final	g	546	550	555	543	510	540	530	551	543	506
Vlc	Net Moisture Gain	ml	265.5	287.5	196.3	371.7	205.4	375.7	199.4	658.2	419.7	246.4

Impinger Weight Gains in Grams

Date 12-16-98

Observers CDB, DRB, JDF

Cycle 2

Specie Doug Fir

Run#	Stack (E or W)	#1 Impinger Init.	#1 Impinger Final	#2 Impinger Init.	#2 Impinger Final	#3 Impinger Init.	#3 Impinger Final	Sl Gel wo Stem Init.	Sl Gel wo Stem Final
1	W	666	677	697	710	569	569	522	533
2	E	831	1016	689	697	755	757	524	535
3	W	677	885	710	720	569	573	522	550
4	E	810	1072	697	707	757	757	522	533
5	W	670	965	693	711	573	576	536	550
6	E	825	1110	693	703	757	759	533	543
7	W	654	1015	679	822	576	579	510	531
8	E	~~829~~ 825	1123	703	721	757	761	525	539
9	W	654	1007	702	766	571	579	522	544
10	E	801	1028	700	712	755	758	523	552
11	W	668	959	687	772	571	578	533	555
12	E	810	1059	689	697	756	756	538	546
13	W	667	928	694	705	572	573	536	550
14	E	836	1016	666	672	756	757	546	555
15	W	662	967	687	732	573	575	524	543
16	E	821	1011	672	679	756	757	503	510
17	W	691	969	695	755	572	588	519	540
18	E	810	987	679	691	757	759	522	530
19	W	655	1047	696	927	571	586	532	551
20	E	811	1121	667	766	756	758	535	543
21	W	648	979	672	679	570	572	500	506

W = Sample box 6 = 98M-206 98S-15

E = Sample box 1 = 98M-200 98S-14

Impinger Weight Gains in Grams

Date 12/14 - 12/16

Observers CDB, DRB, JDP

Cycle 1

Specie Doug Fir

Run#	Stack (E or W)	#1 Impinger Init.	#1 Impinger Final	#2 Impinger Init.	#2 Impinger Final	#3 Impinger Init.	#3 Impinger Final	SI Gel wo Stem Init.	SI Gel wo Stem Final
1	W	850	882	752	773	732	735	550	568
2	E	678	876	691	697	595	595	524	537
3	W	852	1161	736	763	733	737	571	588
4	E	690	949	678	697	595	595	537	548
5	W	849	1130	739	764	732	738	520	534
6	E	653	905	663	683	592	599	507	523
7	W	848	1092	748	761	731	734	513	523
8	E	684	920	683	705	594	598	550	540
9	W	822	1111	761	773	731	735	519	525
10	E	676	923	699	702	596	598	540	550
11	W	858	1165	743	767	733	734	528	543
12	E	677	941	684	714	597	599	517	529
13	W	846	1078	746	813	732	745	536	547
14	E	674	907	686	706	594	600	507	516
15	W	805	1117	748	797	732	745	516	532
16	E	689	928	706	714	595	598	522	531
17	W	826	1153	760	853	735	738	533	547
19	E	664	973	691	770	595	597	531	539
19	W	810	1150	748	881	735	737	528	539
20	E	703	974	650	748	595	600	515	524
21	W	848	959	752	799	732	745	532	540

Horizon Engineering (503) 255-5050

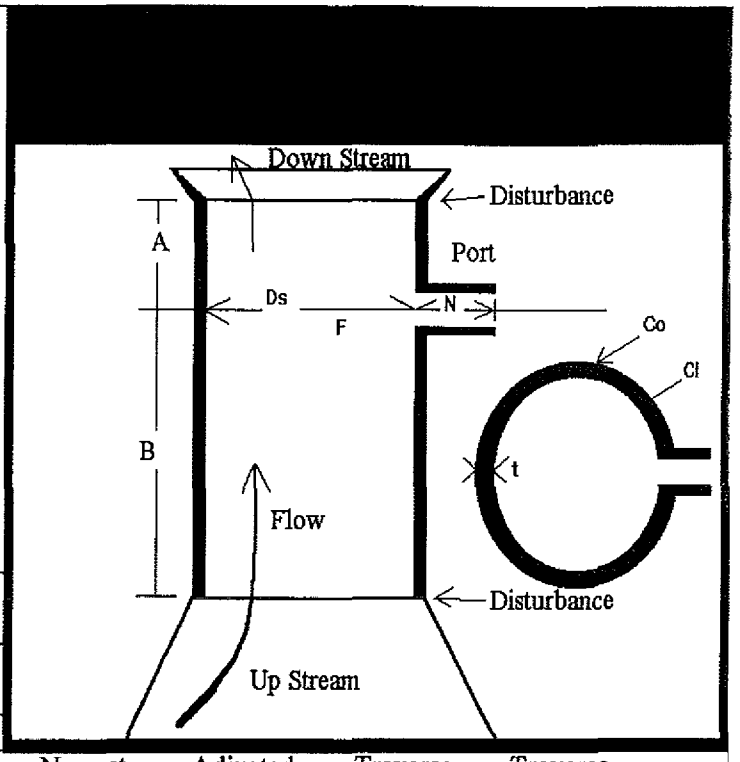
98s-051 = Sample Box 3 = 98m-238

98s 052 = Sam Box 2 = 98m-250

Traverse Point Location - Circular Stack

Willamette Industries - OSU			14-Dec-98
Kiln Test No. 2 Cycle No. 1 Douglas Fir			drb
Corvalis, OR			part_gas
EPA 1			mew

Outer Circumference	Co	in	
Wall thickness	t	in	
INSIDE of FAR WALL to OUTSIDE of Nipple	F	in	14.25
INSIDE of NEAR WALL to OUTSIDE of Nipple	N	in	0.00
STACK WALL to to OUTSIDE of Nipple	N-t	in	
DOWNstream Disturb	A	in	760.0
UPstream Disturb	B	in	308.0
Inner Diameter	Ds	in	14.25
Area	As	sqin	159.5
DOWNstream Ratio	A/Ds		53.33
UPstream Ratio	B/Ds		21.61



Traverse (Particulate)	8
Recommended #Pts/Diameter	4
Traverse (NON-Particulate)	8
Recommended #Pts/Diameter	4
Actual Points per Diameter	12

Trav Pt #No	Fract Stk ID (f)	Stack ID (Ds)	Actual Points (Dsxf)	Nearest 8ths (TP)	Adjusted Points (TP)	Traverse Points (TP + N)	Traverse Points (TP + N)
1	2.13%	14.3	0.3	0.250	0.500	0.500	0 1 / 2
2	6.70%	14.3	1.0	1.000	1.000	1.000	1
3	11.81%	14.3	1.7	1.625	1.625	1.625	1 5 / 8
4	17.73%	14.3	2.5	2.500	2.500	2.500	2 1 / 2
5	25.00%	14.3	3.6	3.625	3.625	3.625	3 5 / 8
6	35.57%	14.3	5.1	5.125	5.125	5.125	5 1 / 8
7	64.43%	14.3	9.2	9.125	9.125	9.125	9 1 / 8
8	75.00%	14.3	10.7	10.750	10.750	10.750	10 3 / 4
9	82.27%	14.3	11.7	11.750	11.750	11.750	11 3 / 4
10	88.19%	14.3	12.6	12.625	12.625	12.625	12 5 / 8
11	93.30%	14.3	13.3	13.250	13.250	13.250	13 1 / 4
12	97.87%	14.3	13.9	14.000	13.750	13.750	13 3 / 4

GASES

TGOC (as Carbon) Emissions - Cycle No.1 Summary

Willamette Ind. - OSU
Cycle No. 1 Douglas Fur - TGOC (as Carbon)
Dec 14-16, 1998

Run ID	Start	End	Time Min	Qsd dscfm	Bws % Kiln	Bws % Analyzer	TGOC [A] ppmv-C	TGOC [A] lbm-C/hr	lbm-C
1	08:50	10:27	97	181.9	5.7%	3.1%	40.7	0.0139	0.0224
Calibration			31					0.0180	0.0093
2	10:58	11:23	25	50.1	17.7%	9.3%	365.1	0.0342	0.0143
Calibration			10					0.0440	0.0073
3	11:33	13:53	140	50.1	17.7%	6.0%	488.8	0.0458	0.1068
Calibration			15					0.0449	0.0112
4	14:08	15:07	59	81.8	20.5%	6.9%	280.0	0.0428	0.0421
Calibration			16					0.0402	0.0107
5	15:23	16:52	89	81.8	20.5%	14.8%	251.3	0.0384	0.0570
Calibration			13					0.0308	0.0067
6	17:05	19:54	169	73.6	12.2%	8.7%	195.2	0.0268	0.0756
Calibration			124					0.0254	0.0524
7	21:58	22:53	55	66.1	18.8%	13.9%	167.8	0.0207	0.0190
Calibration			14					0.0223	0.0052
8	23:07	02:03	176	61.1	20.4%	14.7%	199.0	0.0227	0.0667
Calibration			7					0.0193	0.0022
9	02:10	04:55	165	46.0	23.0%	16.2%	180.9	0.0156	0.0428
Calibration			14					0.0146	0.0034
10	05:09	07:56	167	48.3	22.7%	15.9%	150.7	0.0136	0.0379
Calibration			14					0.0139	0.0032
11	08:10	10:54	164	57.3	22.8%	16.3%	132.8	0.0142	0.0389
Calibration			18					0.0135	0.0040
12	11:12	13:56	164	49.4	23.0%	16.6%	138.1	0.0128	0.0349
Calibration			12					0.0132	0.0026
13	14:08	16:46	158	57.4	23.5%	16.7%	126.8	0.0136	0.0359
Calibration			26					0.0130	0.0056
14	17:12	19:54	162	59.4	20.4%	14.5%	112.2	0.0125	0.0337
Calibration			11					0.0114	0.0021
15	20:05	22:55	170	56.3	22.0%	15.8%	98.5	0.0104	0.0294
Calibration			13					0.0097	0.0021
16	23:08	02:06	178	50.9	21.7%	15.5%	95.1	0.0090	0.0268
Calibration			5					0.0091	0.0008
17	02:11	05:05	174	70.4	22.6%	15.9%	69.9	0.0092	0.0267
Calibration			6					0.0085	0.0008
18	05:11	07:58	167	46.5	22.2%	15.7%	88.9	0.0077	0.0215
Calibration			36					0.0103	0.0062
19	08:34	11:22	168	76.4	24.5%	17.3%	89.9	0.0128	0.0360
Calibration			5					0.0128	0.0011
20	11:27	14:22	175	45.0	31.2%	21.9%	152.5	0.0128	0.0374
Calibration			5					0.0118	0.0010
21	14:27	17:40	193	53.3	32.6%	23.5%	108.4	0.0108	0.0348
Calibration			20					0.0113	0.0038
22	18:00	20:40	160	47.9	30.4%	22.5%	131.6	0.0118	0.0314
Calibration			6					0.0112	0.0011
23	20:46	22:17	91	53.6	29.0%	21.4%	100.9	0.0101	0.0154

	Interval min	Time Weighted Average Qsd dscfm	Bws % Kiln	Bws % Analyzer	ppmv-C	lbm-C/hr [C]	lbm-C
Total Cycle Time	3,687					0.0168	1.0304
Total Actual Testing Time	3,266	60.9	22.6%	15.7%	149.7		
Percent Actual Testing Time of Cycle Time	88.6%						

Production 2,560 bft
0.403 lbm-C/Mdbft (Corrected for calibration intervals)

NOTES

[A] Emissions during calibration intrevals are time weighted averages of the previous and following tests.

[B] The gas sample probe was not moved during run no. 7, the untested time appears in the calibration time interval prior to the gas sampling period.

[C] The time weighted average lbm-C/hr does not match the TGOC emissions average because the missing data explained in [B] occured during a high emissions interval and increases the average.

TGOC (as Carbon) Emissions - Cycle No.2 Summary

Willamette Ind. - OSU
Cycle No. 2 Douglas Fur - TGOC (as Carbon)
Dec 16-19, 1998

Run ID	Start	End	Time Min	Qsd dscfm	Bws % Kiln	Bws % Analyzer	TGOC [A] ppmv-C	TGOC [A] lbm-C/hr	lbm-C
1	22:22	01:00	158	247.3	4.2%	3.1%	97.2	0.0449	0.1184
Calibrations			5					0.0250	0.0021
2	01:05	03:44	159	45.3	18.3%	13.1%	61.9	0.0052	0.0139
Calibrations			6					0.0163	0.0016
3	03:50	06:44	174	53.9	18.3%	13.0%	262.5	0.0265	0.0767
Calibrations			5					0.0242	0.0020
4	06:49	09:41	172	61.1	20.6%	15.0%	192.2	0.0220	0.0630
Calibrations			5					0.0223	0.0019
5	09:46	12:42	176	75.8	20.6%	15.2%	159.1	0.0225	0.0661
Calibrations			5					0.0209	0.0017
6	12:47	15:37	170	53.2	20.3%	15.0%	192.1	0.0191	0.0542
Calibrations			12					0.0228	0.0046
7	15:49	18:37	168	89.0	20.8%	15.4%	159.8	0.0266	0.0745
Calibrations			13					0.0220	0.0048
8	18:50	21:36	166	62.7	23.0%	16.9%	148.0	0.0174	0.0480
Calibrations			10					0.0177	0.0030
9	21:46	00:48	182	76.2	22.6%	16.4%	126.5	0.0180	0.0547
Calibrations			10					0.0145	0.0024
10	00:58	03:48	170	44.2	22.7%	16.5%	130.6	0.0108	0.0306
Calibrations			6					0.0146	0.0015
11	03:54	06:38	164	81.8	22.7%	16.6%	121.7	0.0186	0.0509
Calibrations			14					0.0143	0.0033
12	06:52	09:51	179	49.2	22.6%	16.6%	111.8	0.0103	0.0307
Calibrations			6					0.0113	0.0011
13	09:57	12:38	161	79.2	23.0%	16.8%	83.3	0.0123	0.0331
Calibrations			10					0.0106	0.0018
14	12:48	15:39	171	54.6	22.9%	16.6%	88.4	0.0090	0.0257
Calibrations			15					0.0112	0.0028
15	15:54	18:39	165	92.8	17.9%	12.8%	77.0	0.0134	0.0368
Calibrations			9					0.0098	0.0015
16	18:48	21:54	186	52.0	17.1%	12.3%	68.3	0.0066	0.0206
Calibrations			16					0.0095	0.0025
17	22:10	00:55	165	93.5	17.8%	12.9%	72.5	0.0127	0.0349
Calibrations			14					0.0096	0.0022
18	01:09	04:05	176	50.4	17.0%	12.0%	71.8	0.0068	0.0198
Calibrations			5					0.0104	0.0009
19	04:10	07:04	174	68.2	17.1%	12.1%	109.7	0.0140	0.0406
Calibrations			6					0.0120	0.0012
20	07:10	09:56	166	45.6	17.3%	12.2%	115.7	0.0099	0.0273
Calibrations			12					0.0105	0.0021
21	10:08	11:21	73	57.3	30.6%	21.2%	112.8	0.0121	0.0147

	Interval min	Time Weighted Average Qsd dscfm	Bws % Kiln	Bws % Analyzer	ppmv-C	lbm-C/hr	lbm-C
Total Cycle Time	3,659					0.0161	0.9801
Total Actual Testing Time	3,475	72.7	19.6%	14.2%	122.6		
Percent Actual Testing Time of Cycle Time	95.0%						

Production 2,304 bft
0.425 lbm-C/Mdbft (Corrected for calibration intervals)

NOTES [A] Emissions during calibration intrevals are time weighted averages of the previous and following tests.

TGOC Data Emissions 1 of 2

Willamette Industries - OSU Test 2 Cycle 1- Douglas Fir TGOC-EPA 25A														14-Dec-98
Number of Completed Runs			1	2	3	4	5	6	7	8	9	10	11	12	Average
			west	east	west	east	west	east	west	east	west	east	west	east	Time Weight
Date Tested			14-Dec	14-Dec	14-Dec	14-Dec	14-Dec	14-Dec	14-Dec	14-Dec	15-Dec	15-Dec	15-Dec	15-Dec	
System Calibration Time - Initial		Tci	08:40	10:42	11:30	14:00	15:20	16:58	20:00	23:00	02:06	05:02	08:03	11:03	
Test Time-Starting		Tts	08:50	10:58	11:33	14:08	15:23	17:05	21:58	23:07	02:10	05:09	08:10	11:12	
Test Time-Ending		Tte	10:27	11:23	13:53	15:07	16:52	19:54	22:53	02:03	04:55	07:56	10:54	13:56	
System Calibration Time - Final		Tcf	10:42	11:28	14:00	15:13	16:58	20:00	23:00	02:06	05:02	08:03	11:03	14:02	
Test Mid-point Time		Tx	09:38	11:10	12:43	14:37	16:07	18:29	22:25	00:35	03:32	06:32	09:32	12:34	
Time		min	97	25	140	59	89	169	55	176	165	167	164	164	
Volumetric Flowrate, Dry Standard	dscf/min	Qsd	181.9	50.1	50.1	81.8	81.8	73.6	66.1	61.1	46.0	48.3	57.3	49.4	60.9
Moisture, Mole Fraction dry Gas		mfg	94%	82%	82%	80%	80%	88%	81%	80%	77%	77%	77%	77%	77.4%
Moisture (Kiln)		bws	5.7%	17.7%	17.7%	20.5%	20.5%	12.2%	18.8%	20.4%	23.0%	22.7%	22.8%	23.0%	22.6%
Moisture (Analyzer)		bws	3.1%	9.3%	6.0%	6.9%	14.8%	8.7%	13.9%	14.7%	16.2%	15.9%	16.3%	16.6%	15.7%
Dilution	bws(analyzer)/bws(kiln		53.2%	52.7%	33.9%	33.5%	72.1%	71.6%	73.6%	72.1%	70.1%	70.0%	71.5%	72.2%	68.4%
Total Gaseous Organic Concentration	**(TGOC)**	Span	100	100	100	100	100	100	100	100	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Span Gas- Carbon Count Equivalent		K	3												
Cylinder Value - High Range calibration gas	ppmv		84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Indicated average- Wet	ppmv-C3H8	Ciw	7.34	59.21	52.60	30.29	51.73	42.68	35.58	41.06	35.91	30.41	27.06	28.18	27.7
Span Gas Concentration- Equivalent	ppmv	Sc	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Zero Gas Concentration- Equivalent	ppmv	Zc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
System Calibration Response - High Range gas - Initia	ppmv	Ss	44.8	45.2	29.5	28.8	61.4	60.2	60.4	62.3	59.5	59.3	60.0	61.3	
System Calibration Response - Low Range gas - Initial	ppmv	Zs	0.2	0.5	0.3	1.1	0.0	0.5	-0.2	0.2	0.3	0.6	1.1	0.0	
System Calibration Response - Low Range gas - Final	ppmv	Ze	0.5	1.4	1.1	1.3	0.5	-0.2	0.2	0.3	0.6	1.1	0.0	1.0	
System Calibration Response - High Range gas - Final	ppmv	Se	45.2	45.4	28.8	29.8	60.2	60.4	62.3	59.5	59.3	60.0	61.3	60.9	
Actual average - Wet (Corrected for Drift & Response	ppmv-C3H8		13.2	110.4	153.2	86.9	71.4	59.4	48.2	56.6	50.5	42.2	37.1	38.4	42.7
Actual average - Dry (Corrected for Drift & Response	ppmv-C3H8		13.6	121.7	162.9	93.3	83.8	65.1	55.9	66.3	60.3	50.2	44.3	46.0	49.9
Actual average - Dry	ppmv-C	Cgas	40.7	365.1	488.8	280.0	251.3	195.2	167.8	199.0	180.9	150.7	132.8	138.1	149.7
Mass Emissions	lbm / hr		0.0139	0.0342	0.0458	0.0428	0.0384	0.0268	0.0207	0.0227	0.0156	0.0136	0.0142	0.0128	0.0163

TGOC Data Emissions 2 of 2

Willamette Industries - OSU Test 2 Cycle 1- Douglas Fir TGOC-EPA 25A														14-Dec-98
Number of Completed Runs			12	13	14	15	16	17	18	19	20	21	22	23	Average
			east	west	east	west	east	west	east	west	east	west	east	west	Time Weight
Date Tested			15-Dec	15-Dec	15-Dec	15-Dec	15-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	16-Dec	
System Calibration Time - Initial		Tci	11:03	14:02	16:59	19:59	23:01	02:08	05:08	08:16	11:24	14:24	17:50	20:43	
Test Time-Starting		Tts	11:12	14:08	17:12	20:05	23:08	02:11	05:11	08:34	11:27	14:27	18:00	20:46	
Test Time-Ending		Tte	13:56	16:46	19:54	22:55	02:06	05:05	07:58	11:22	14:22	17:40	20:40	22:17	
System Calibration Time - Final		Tcf	14:02	16:59	19:59	23:01	02:08	05:08	08:16	11:24	14:24	17:50	20:43	22:25	
Test Mid-point Time		Tx	12:34	15:27	18:33	21:30	00:37	03:38	06:34	09:58	12:54	16:03	19:20	21:31	
Time		min	164	158	162	170	178	174	167	168	175	193	160	91	
Volumetric Flowrate, Dry Standard	dscf/min	Qsd	49.4	57.4	59.4	56.3	50.9	70.4	46.5	76.4	45.0	53.3	47.9	53.6	60.9
Moisture, Mole Fraction dry Gas		mfg	77%	77%	80%	78%	78%	77%	78%	75%	69%	67%	70%	71%	77.4%
Moisture (Kiln)		bws	23.0%	23.5%	20.4%	22.0%	21.7%	22.6%	22.2%	24.5%	31.2%	32.6%	30.4%	29.0%	22.6%
Moisture (Analyzer)		bws	16.6%	16.7%	14.5%	15.8%	15.5%	15.9%	15.7%	17.3%	21.9%	23.5%	22.5%	21.4%	15.7%
Dilution	bws(analyzer)/bws(kiln		72.2%	71.1%	71.1%	72.0%	71.3%	70.1%	70.4%	70.6%	70.1%	72.1%	73.8%	73.7%	68.4%
Total Gaseous Organic Concentration	**(TGOC)**	Span	100	100	100	100	100	100	100	100	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Span Gas- Carbon Count Equivalent		K													
Cylinder Value - High Range calibration gas	ppmv		84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Indicated average- Wet	ppmv-C3H8	Ciw	28.18	25.82	23.09	19.89	19.42	14.49	17.94	17.96	28.97	20.60	25.30	19.75	27.7
Span Gas Concentration- Equivalent	ppmv	Sc	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Zero Gas Concentration- Equivalent	ppmv	Zc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
System Calibration Response - High Range gas - Initia	ppmv	Ss	61.3	60.9	60.1	60.1	60.8	59.6	59.6	59.4	60.1	59.9	62.6	61.8	
System Calibration Response - Low Range gas - Initial	ppmv	Zs	0.0	1.0	0.6	0.1	-0.1	0.7	0.8	-0.2	1.0	1.3	0.0	0.4	
System Calibration Response - Low Range gas - Final	ppmv	Ze	1.0	0.6	0.1	-0.1	0.7	0.8	-0.2	1.0	1.3	0.0	0.4	0.1	
System Calibration Response - High Range gas - Final	ppmv	Se	60.9	60.1	60.1	60.8	59.6	59.6	59.4	60.1	59.9	62.6	61.8	62.6	
Actual average - Wet (Corrected for Drift & Response	ppmv-C3H8		38.4	35.2	32.0	27.6	26.8	19.6	25.0	24.8	39.7	27.7	34.0	26.4	42.7
Actual average - Dry (Corrected for Drift & Response	ppmv-C3H8		46.0	42.3	37.4	32.8	31.7	23.3	29.6	30.0	50.8	36.1	43.9	33.6	49.9
Actual average - Dry	ppmv-C	Cgas	138.1	126.8	112.2	98.5	95.1	69.9	88.9	89.9	152.5	108.4	131.6	100.9	149.7
Mass Emissions	lbm / hr		0.0128	0.0136	0.0125	0.0104	0.0090	0.0092	0.0077	0.0128	0.0128	0.0108	0.0118	0.0101	0.0163

TGOC Data Emissions 1 of 2

Willamette Industries - OSU
Test 2 Cycle 2- Douglas Fir

TGOC-EPA 25A

16-Dec-98

Number of Completed Runs			1	2	3	4	5	6	7	8	9	10	11	12	Average
			west	east	west	east	west	east	west	east	west	east	west	east	Time Weight
Date Tested			16-Dec	**17-Dec**	17-Dec	17-Dec	17-Dec	17-Dec	17-Dec	17-Dec	17-Dec	**18-Dec**	18-Dec	18-Dec	
System Calibration Time - Initial		Tci	22:15	01:02	03:47	06:46	09:43	12:44	15:43	18:43	21:41	00:53	03:51	06:45	
Test Time-Starting		Tts	22:22	01:05	03:50	06:49	09:46	12:47	15:49	18:50	21:46	00:58	03:54	06:52	
Test Time-Ending		Tte	01:00	03:44	06:44	09:41	12:42	15:37	18:37	21:36	00:48	03:48	06:38	09:51	
System Calibration Time - Final		Tcf	01:02	03:47	06:46	09:43	12:44	15:43	18:43	21:41	00:53	03:51	06:45	09:54	
Test Mid-point Time		Tx	23:41	02:24	05:17	08:15	11:14	14:12	17:13	20:13	23:17	02:23	05:16	08:21	
Time		min	158	159	174	172	176	170	168	166	182	170	164	179	
Volumetric Flowrate, Dry Standard	dscf/min	Qsd	247.3	45.3	53.9	61.1	75.8	53.2	89.0	62.7	76.2	44.2	81.8	49.2	72.7
Moisture, Mole Fraction dry Gas		mfg	95.8%	81.7%	81.7%	79.4%	79.4%	79.7%	79.2%	77.0%	77.4%	77.3%	77.3%	77.4%	80.4%
Moisture (Kiln)		bws	4.2%	18.3%	18.3%	20.6%	20.6%	20.3%	20.8%	23.0%	22.6%	22.7%	22.7%	22.6%	19.6%
Moisture (Analyzer)		bws	3.1%	13.1%	13.0%	15.0%	15.2%	15.0%	15.4%	16.9%	16.4%	16.5%	16.6%	16.6%	14.2%
Dilution	bws(analyzer)/bws(kiln		73.5%	71.7%	71.1%	72.7%	73.9%	73.7%	74.2%	73.3%	72.3%	72.7%	73.4%	73.4%	72.4%
Total Gaseous Organic Concentration	**(TGOC)**	Span	100	100	100	100	100	100	100	100	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Span Gas- Carbon Count Equivalent		K	3												
Cylinder Value - High Range calibration gas	ppmv		84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Indicated average- Wet	ppmv-C3H8	Ciw	23.32	13.38	54.55	40.20	34.27	41.35	34.19	30.57	26.10	26.68	24.82	23.39	25.9
Span Gas Concentration- Equivalent	ppmv	Sc	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Zero Gas Concentration- Equivalent	ppmv	Zc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
System Calibration Response - High Range gas - Initia	ppmv	Ss	62.6	61.4	60.2	60.2	63.2	63.0	63.3	62.9	61.3	61.4	61.3	62.1	
System Calibration Response - Low Range gas - Initial	ppmv	Zs	0.1	0.4	0.7	0.3	0.9	1.2	1.2	0.3	0.7	0.5	0.0	-0.0	
System Calibration Response - Low Range gas - Final	ppmv	Ze	0.4	0.7	0.3	0.9	1.2	1.2	0.3	0.7	0.5	0.0	-0.0	1.2	
System Calibration Response - High Range gas - Final	ppmv	Se	61.4	60.2	60.2	63.2	63.0	63.3	62.9	61.3	61.4	61.3	62.1	62.4	
Actual average - Wet (Corrected for Drift & Response	ppmv-C3H8		31.4	17.9	76.1	54.5	45.0	54.4	45.1	41.0	35.3	36.3	33.8	31.1	35.0
Actual average - Dry (Corrected for Drift & Response	ppmv-C3H8		32.4	20.6	87.5	64.1	53.0	64.0	53.3	49.3	42.2	43.5	40.6	37.3	40.9
Actual average - Dry	ppmv-C	Cgas	97.2	61.9	262.5	192.2	159.1	192.1	159.8	148.0	126.5	130.6	121.7	111.8	122.6
Mass Emissions	lbm / hr		0.0449	0.0052	0.0265	0.0220	0.0225	0.0191	0.0266	0.0174	0.0180	0.0108	0.0186	0.0103	0.0161

TGOC Data Emissions 2 of 2

Willamette Industries - OSU
Test 2 Cycle 2- Douglas Fir

16-Dec-98

TGOC-EPA 25A

Number of Completed Runs			12	13	14	15	16	17	18	19	20	21	Average
			east	west	east	west	east	west	east	west	east	west	Time Weight
Date Tested			18-Dec	18-Dec	18-Dec	18-Dec	18-Dec	18-Dec	**19-Dec**	19-Dec	19-Dec	19-Dec	
System Calibration Time - Initial		Tci	06:45	09:54	12:43	15:46	18:43	22:02	01:02	04:07	07:07	10:02	
Test Time-Starting		Tts	06:52	09:57	12:48	15:54	18:48	22:10	01:09	04:10	07:10	10:08	
Test Time-Ending		Tte	09:51	12:38	15:39	18:39	21:54	00:55	04:05	07:04	09:56	11:21	
System Calibration Time - Final		Tcf	09:54	12:43	15:46	18:43	22:02	01:02	04:07	07:07	10:02	11:23	
Test Mid-point Time		Tx	08:21	11:17	14:13	17:16	20:21	23:32	02:37	05:37	08:33	10:44	
Time		min	179	161	171	165	186	165	176	174	166	73	
Volumetric Flowrate, Dry Standard	dscf/min	Qsd	49.2	79.2	54.6	92.8	52.0	93.5	50.4	68.2	45.6	57.3	72.7
Moisture, Mole Fraction dry Gas		mfg	77.4%	77.0%	77.1%	82.1%	82.9%	82.2%	83.0%	82.9%	82.7%	69.4%	80.4%
Moisture (Kiln)		bws	22.6%	23.0%	22.9%	17.9%	17.1%	17.8%	17.0%	17.1%	17.3%	30.6%	19.6%
Moisture (Analyzer)		bws	16.6%	16.8%	16.6%	12.8%	12.3%	12.9%	12.0%	12.1%	12.2%	21.2%	14.2%
Dilution	bws(analyzer)/bws(kiln		73.4%	72.9%	72.6%	71.5%	72.1%	72.4%	70.9%	70.7%	70.6%	69.3%	72.4%
Total Gaseous Organic Concentration	**(TGOC)**	Span	100	100	100	100	100	100	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Span Gas- Carbon Count Equivalent		K											
Cylinder Value - High Range calibration gas	ppmv		84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Indicated average- Wet	ppmv-C3H8	Ciw	23.39	17.93	18.85	16.69	14.54	15.15	14.90	22.87	24.14	21.04	25.9
Span Gas Concentration- Equivalent	ppmv	Sc	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	
Zero Gas Concentration- Equivalent	ppmv	Zc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
System Calibration Response - High Range gas - Initi	ppmv	Ss	62.1	62.4	62.2	61.8	59.7	61.7	59.8	59.3	59.7	59.4	
System Calibration Response - Low Range gas - Initi	ppmv	Zs	-0.0	1.2	1.0	1.0	0.4	-0.1	-0.1	0.0	0.3	0.2	
System Calibration Response - Low Range gas - Final	ppmv	Ze	1.2	1.0	1.0	0.4	-0.1	-0.1	0.0	0.3	0.2	0.8	
System Calibration Response - High Range gas - Fina	ppmv	Se	62.4	62.2	61.8	59.7	61.7	59.8	59.3	59.7	59.4	58.1	
Actual average - Wet (Corrected for Drift & Respons	ppmv-C3H8		31.1	23.1	24.6	22.4	20.0	21.0	21.0	32.1	33.8	29.6	35.0
Actual average - Dry (Corrected for Drift & Respons	ppmv-C3H8		37.3	27.8	29.5	25.7	22.8	24.2	23.9	36.6	38.6	37.6	40.9
Actual average - Dry	ppmv-C	Cgas	111.8	83.3	88.4	77.0	68.3	72.5	71.8	109.7	115.7	112.8	122.6
Mass Emissions	lbm / hr		0.0103	0.0123	0.0090	0.0134	0.0066	0.0127	0.0068	0.0140	0.0099	0.0121	0.0161

Calibration Field Record

Client OSJ/OSJ
Date 12-19-98
Source OSJ

Tester DR/JDF/CDB
Observer
Data Logger ID RP

830-845
w/o - Dil = 5.5 w/dil w/dil

Leak Checks: Pre-OK Post-OK Response Time	Valve Position	Cylinder #	Span Gas	Cylinder Value (CV)	Analyzer Calibration Response (ACR)	Start Run 1 System Calibration Response (SCRx)	End Run __ Start Run __ System Calibration Response (SCRx)	End Run __ Start Run __ System Calibration Response (SCRx)	End Run __ System Calibration Response (SCRx)	
Times						835	840	1033	1120	
CO2 % ch___			CO2	0		-.6	0.2	0.5	1.4	
Range		14	CO2	27.92		27.49	14.9	14.9	15.1	
Analyzer Model		23	N2	50.5		49.3	26.5	26.4	27.0	
Analyzer SN:		33		84.0		84.0	44.8	45.2	45.4	
CO ppm ch___			CO							
Range			CO							
Analyzer Model			N2			Recal		w/ dil	w/dil	w/dil
Analyzer SN:		12-14 time ↓		1124	1400	1508	1515	1700	2000	2300
O2% ch___		0	O2	0.3	1.10	1.3	0.0	0.5	-0.2	0.2
Range		14	O2	9.8	9.8	10.2	19.9	20.0	19.4	20.0
Analyzer Model		23	N2	17.32	17.1	17.5	35.9	35.7	35.3	35.9
Analyzer SN:		33		29.5	28.8	29.8	61.4	60.2	60.4	62.3
NOx ppm ch___			NOx							
Range			NOx							
Analyzer Model			N2							
Analyzer SN:		12/15	Time 2303		503	757	1104	1400	1705	2000
TGOC ppm ch___		0		0.34	0.59	1.09	0.0	0.15	0.60	0.1
Range		14		19.71	19.67	19.80	19.8	19.8	20.0	19.5
Analyzer Model		23		35.41	35.25	35.27	35.7	35.7	35.8	35.4
Analyzer SN:		33	Air	59.47	59.28	60.01	61.3	60.9	60.1	60.1
			Time	2303	12/16→	206	505	802	1120	1420
ch___		0		-0.1		0.73	0.78	-0.2	1.0	1.3
Range		14		19.4		18.66	19.78	18.9	19.3	19.2
Analyzer Model		23		35.2		34.27	34.86	34.4	34.0	34.9
Analyzer SN:		33		60.8		59.64	59.59	59.4	60.1	59.9

Check	Performance Specs			
Analyzer Calibration Error	|ACR-CV| / SPAN	2 (25A @ 5%)	Hot Line Temp	127°C Monday
Sampling System Bias	(SRCx-ACR) /SPAN	5	Hot Line Temp	134°C Wed
Zero and Cal Drift	(SRC2-SRC1) /SPAN	3		

855-1025
938-

Test Times	Run 1	Run 2	Run 3
Start Time			
End Time			

Calibration Field Record

Client OSU/WI
Date 12-16-98
Source Dry Kiln

Recal
Fuel P=0
w/o d.l w/d.l

Tester JDF/COB/DRB
Observer
Data Logger ID RR

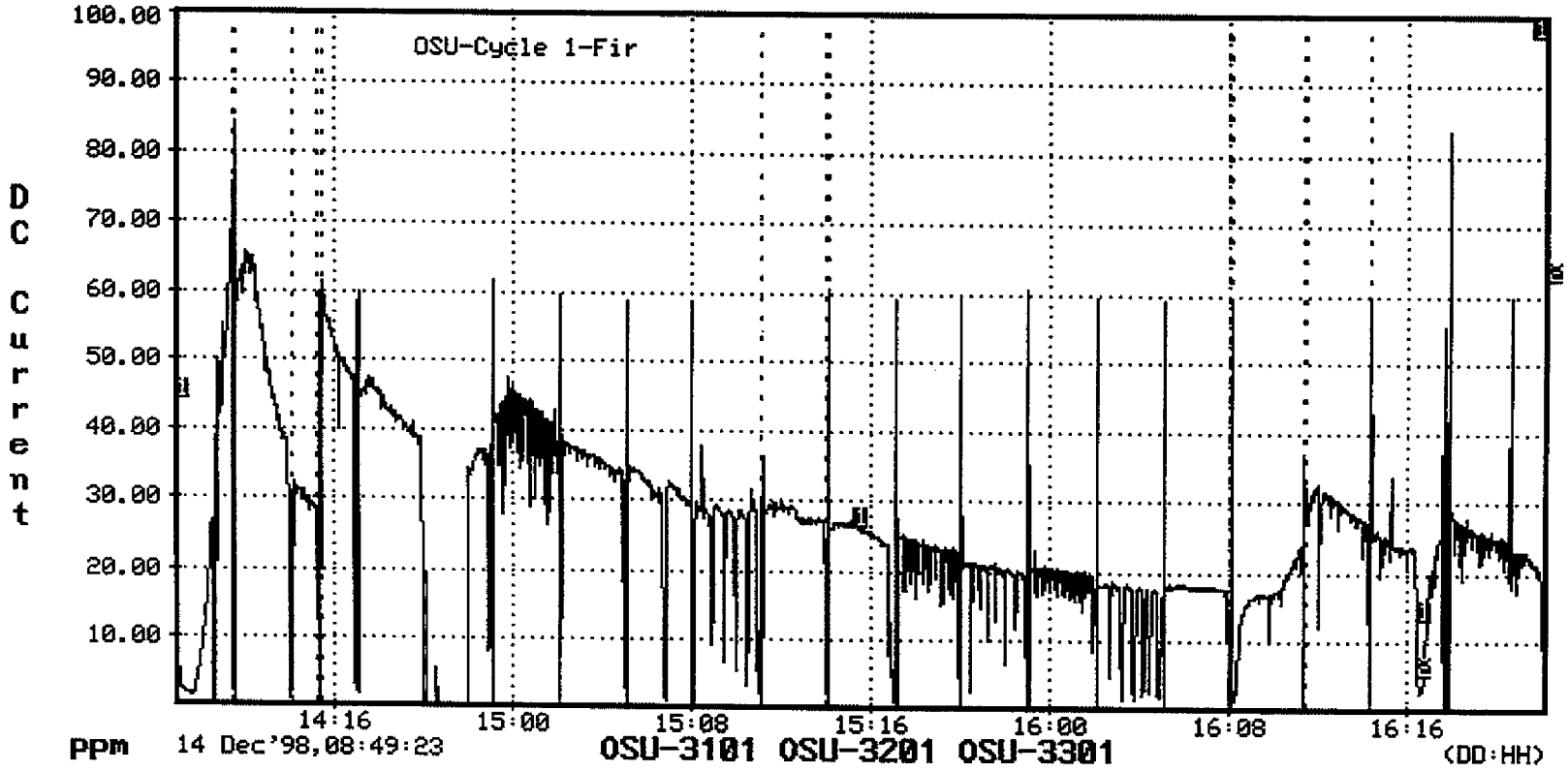
end cycle 1

Leak Checks: Pre-OK Post-OK Response Time	Valve Position	Cylinder #	Span Gas	Cylinder Value (CV)	12-16-98 Analyzer Calibration Response (ACR)	Start Run __ System Calibration Response (SCRx)	End Run __ Start Run __ System Calibration Response (SCRx)	End Run 1 (cycle) Start Run 2 System Calibration Response (SCRx)	End Run __ System Calibration Response (SCRx)	
Times					1739	1755	2040	2215		
CO2 % ch___			CO2	0	0.0	0.0	0.4	0.1		
Range		14	CO2	27.92	27.2	19.8	20.5	20.3		
Analyzer Model		23	N2	50.5	49.3	35.9	36.8	36.5		
Analyzer SN:		33		84.0	84.0	62.6	61.8	62.6		
CO ppm ch___			CO							
Range			CO							
Analyzer Model			N2							
Analyzer SN:		12/17	Time	100	345	644	938	1239	1542	1845
O2% ch___			O2	0.42	0.65	0.28	0.9	1.2	1.2	0.3
Range			O2	20.63	20.61	20.83	20.7	20.8	20.9	20.7
Analyzer Model			N2	36.68	36.83	36.60	36.8	36.9	37.1	37.0
Analyzer SN:				61.37	60.19	60.15	63.2	63.0	63.3	62.9
NOx ppm ch___			NOx							
Range			NOx							
Analyzer Model			N2	12/17	12/18 →					
Analyzer SN:				2140	1252	349	647	950	1242	1549
TGOC ppm ch___				0.7	0.48	0.02	-.04	1.2	1.0	1.0
Range		14		20.4	20.19	20.28	20.59	20.4	20.3	19.9
Analyzer Model		23		36.7	36.38	36.52	36.78	36.4	36.4	35.9
Analyzer SN:		33		61.3	61.36	61.33	62.06	62.4	62.2	61.8
				1842	2202	1044	405	705	1003	1123
ch___				0.4	-0.1	-.08	0.04	0.27	0.19	0.8
Range		14		20.3	19.9	20.18	20.10	19.97	19.71	19.6
Analyzer Model		23		36.3	36.0	35.64	35.54	35.59	35.41	35.4
Analyzer SN:		33		59.7	61.7	59.78	59.33	59.73	59.40	58.1

Check	Performance Specs			
Analyzer Calibration Error	|ACR-CV| / SPAN	2 (25A @ 5%)	Hot Line Temp	133°C
Sampling System Bias	(SRCx-ACR) /SPAN	5	Hot Line Temp	
Zero and Cal Drift	(SRC2-SRC1) /SPAN	3		

Test Times	Run 1	Run 2	Run 3
Start Time			
End Time			

12/17 @ 105 change to 10,000 scale
@ 350 change to 1000 scale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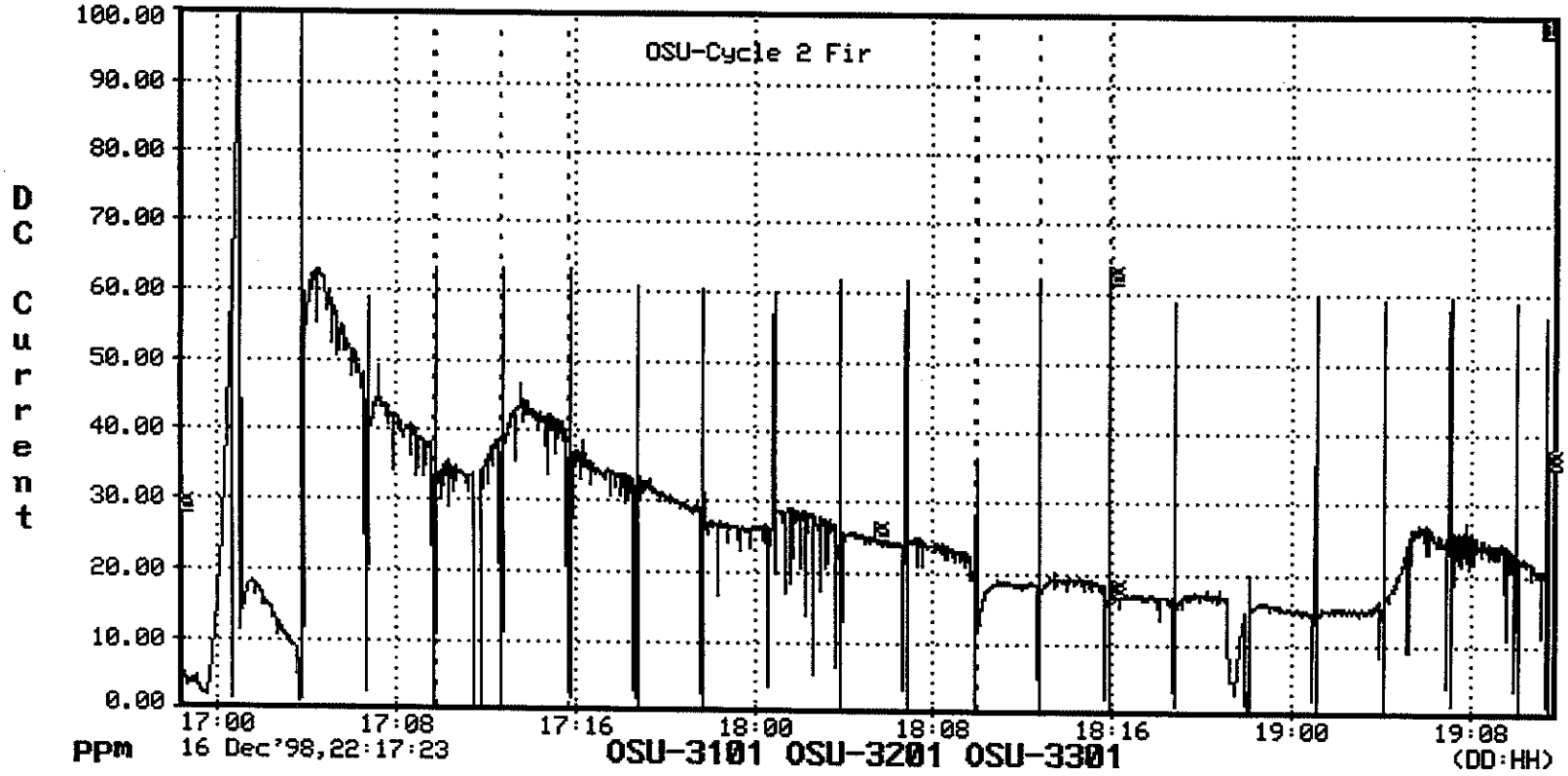
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
DC Current
14:16
15:00
15:08
15:16
16:00
16:08
16:16
ppm
14 Dec'98,08:49:23
OSU-3101 OSU-3201 OSU-3301
(DD:HH)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DC Current
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90.00
80.00
70.00
60.00
50.00
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30.00
20.00
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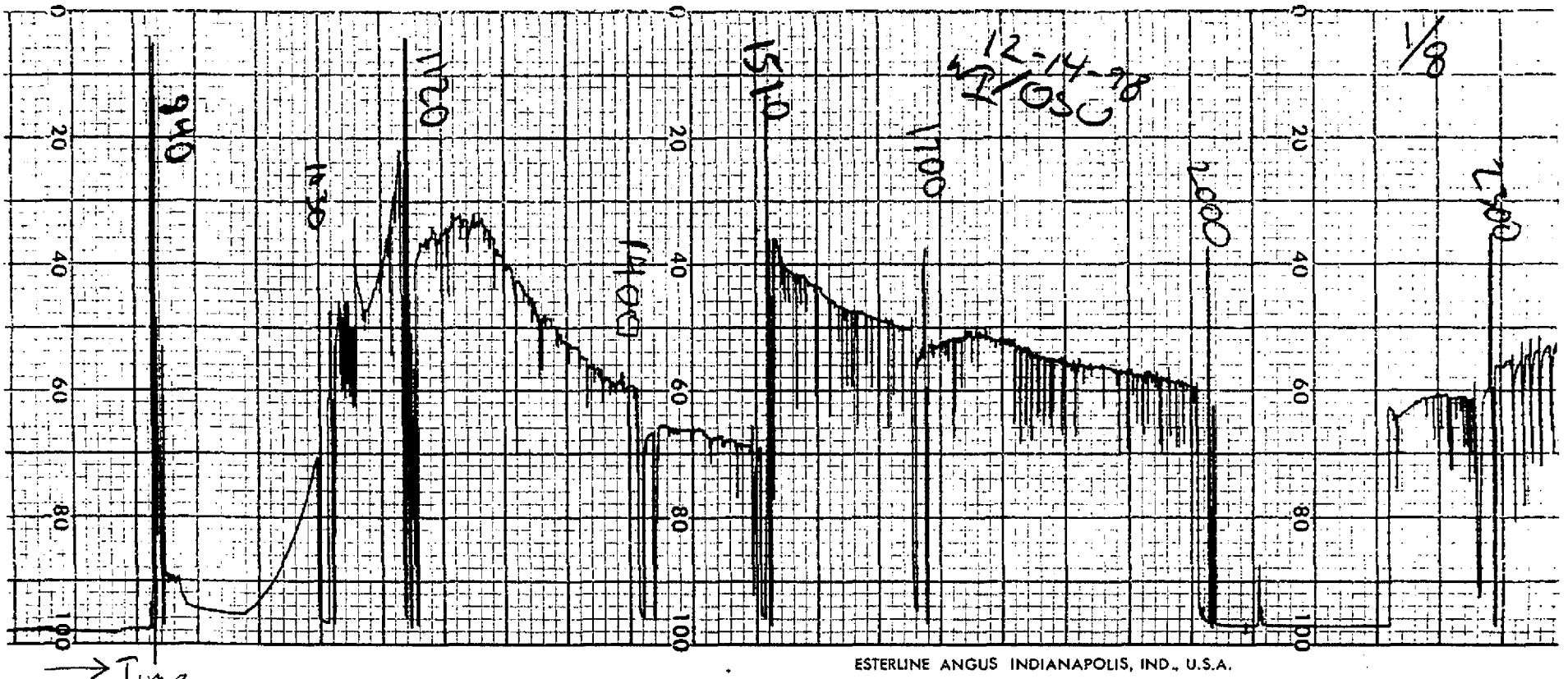
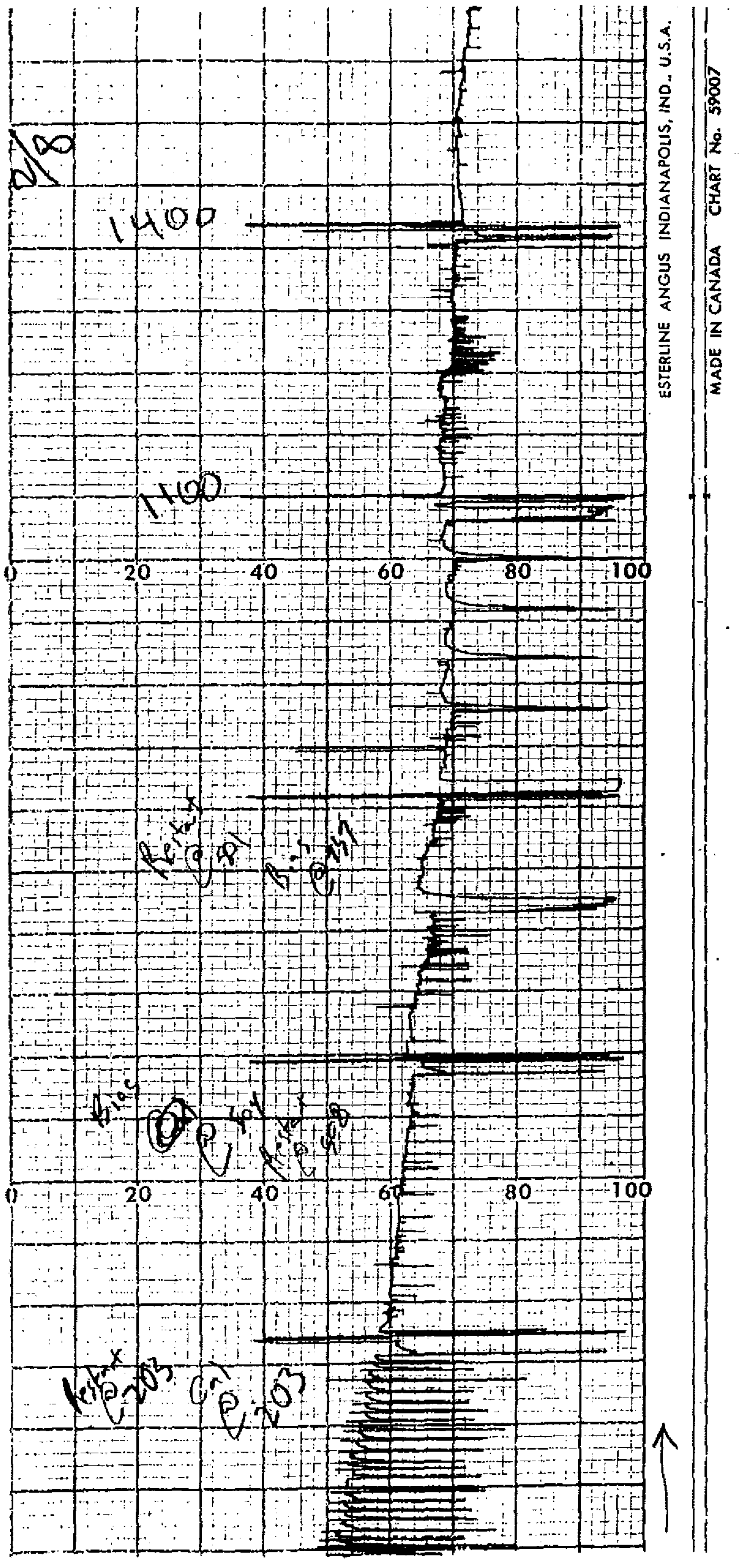
0.00
17:00
17:08
17:16
18:00
18:08
18:16
19:00
19:08
(DD:HH)
PPM
16 Dec'98,22:17:23
OSU-3101 OSU-3201 OSU-3301



ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.

MADE IN CANADA CHART No. 59007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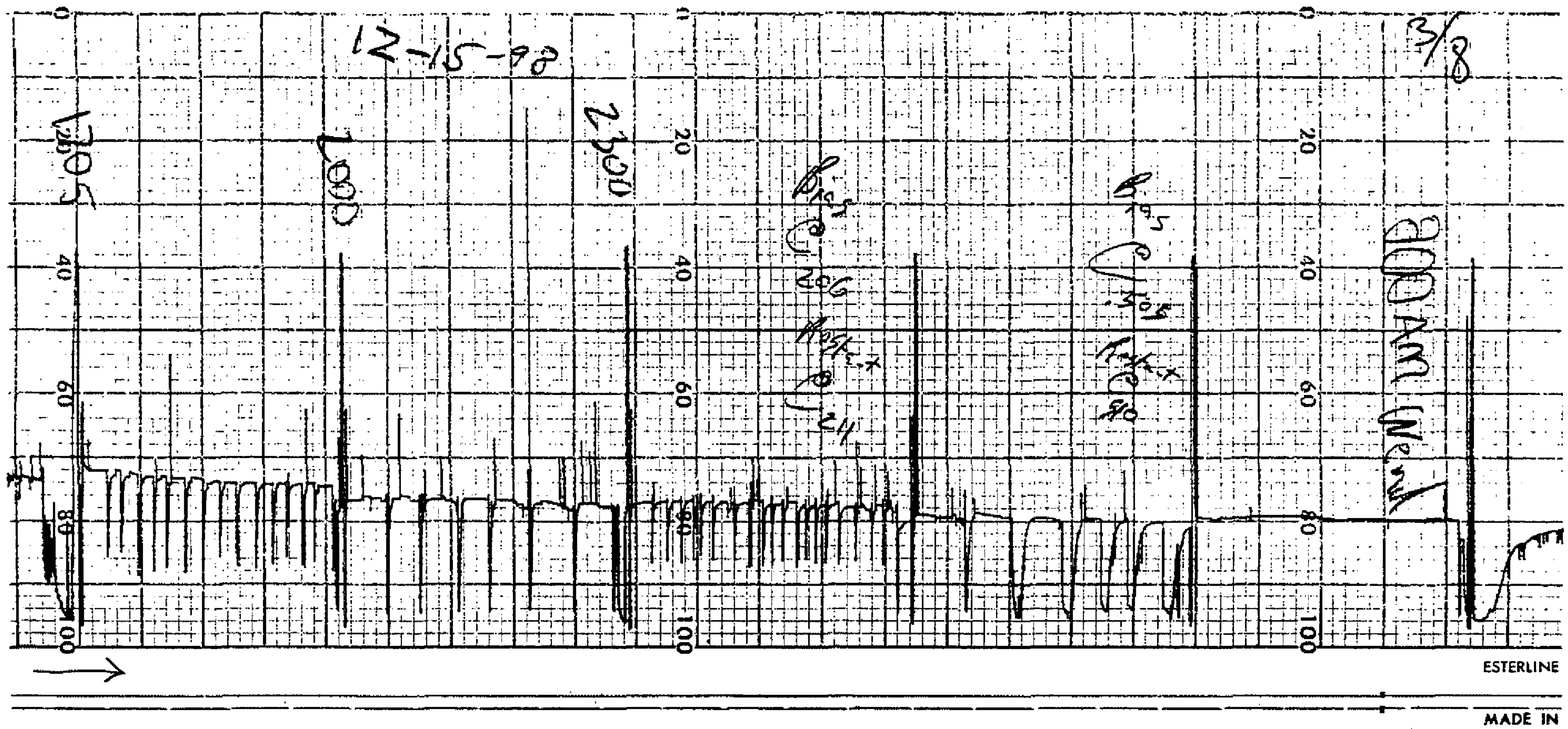
0 20 40 60 80 100
1400
1100


12-15-98
1705
2000
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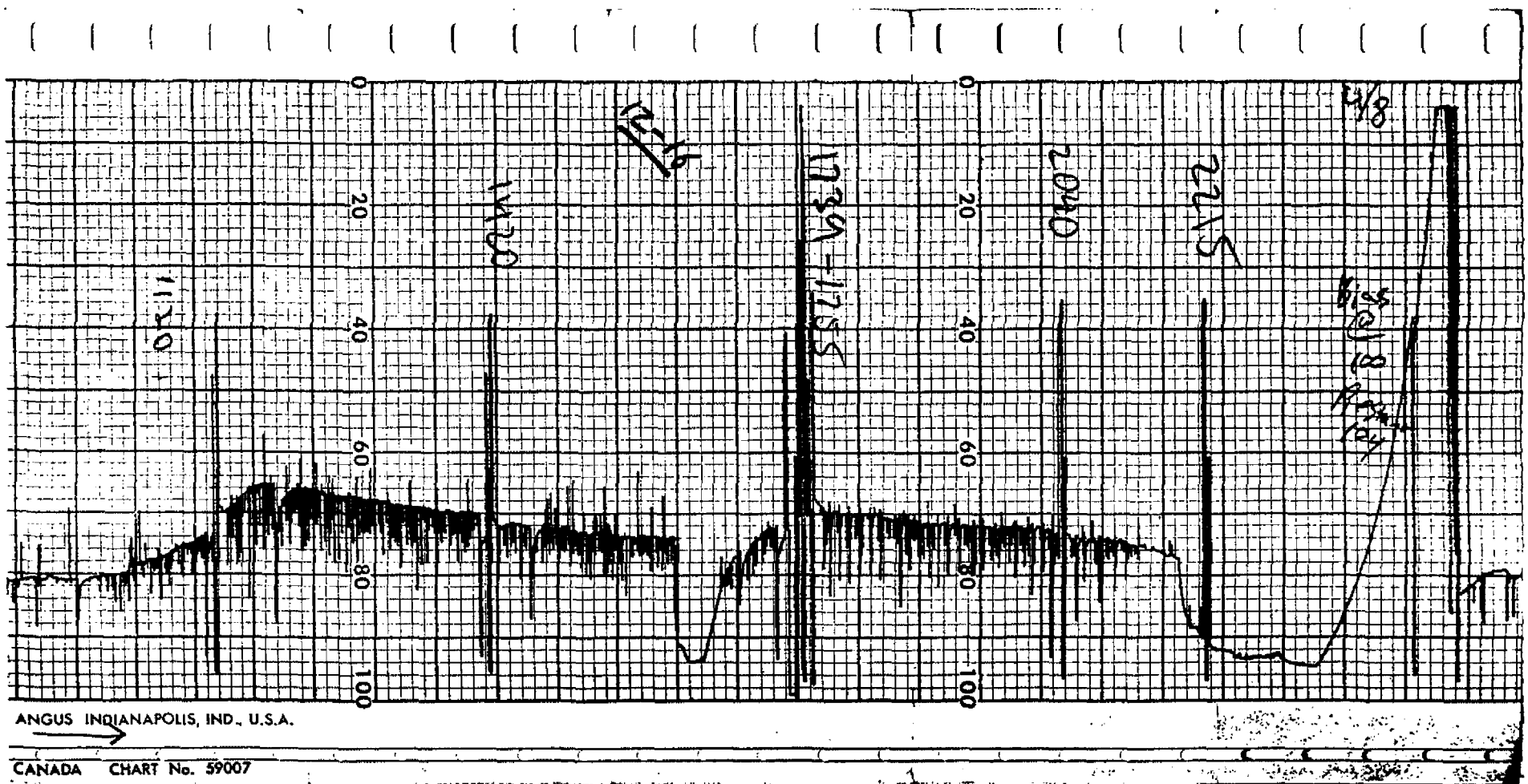
3/8
900 AM Wed
ESTERLINE
MADE IN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ANGUS INDIANAPOLIS, IND., U.S.A.
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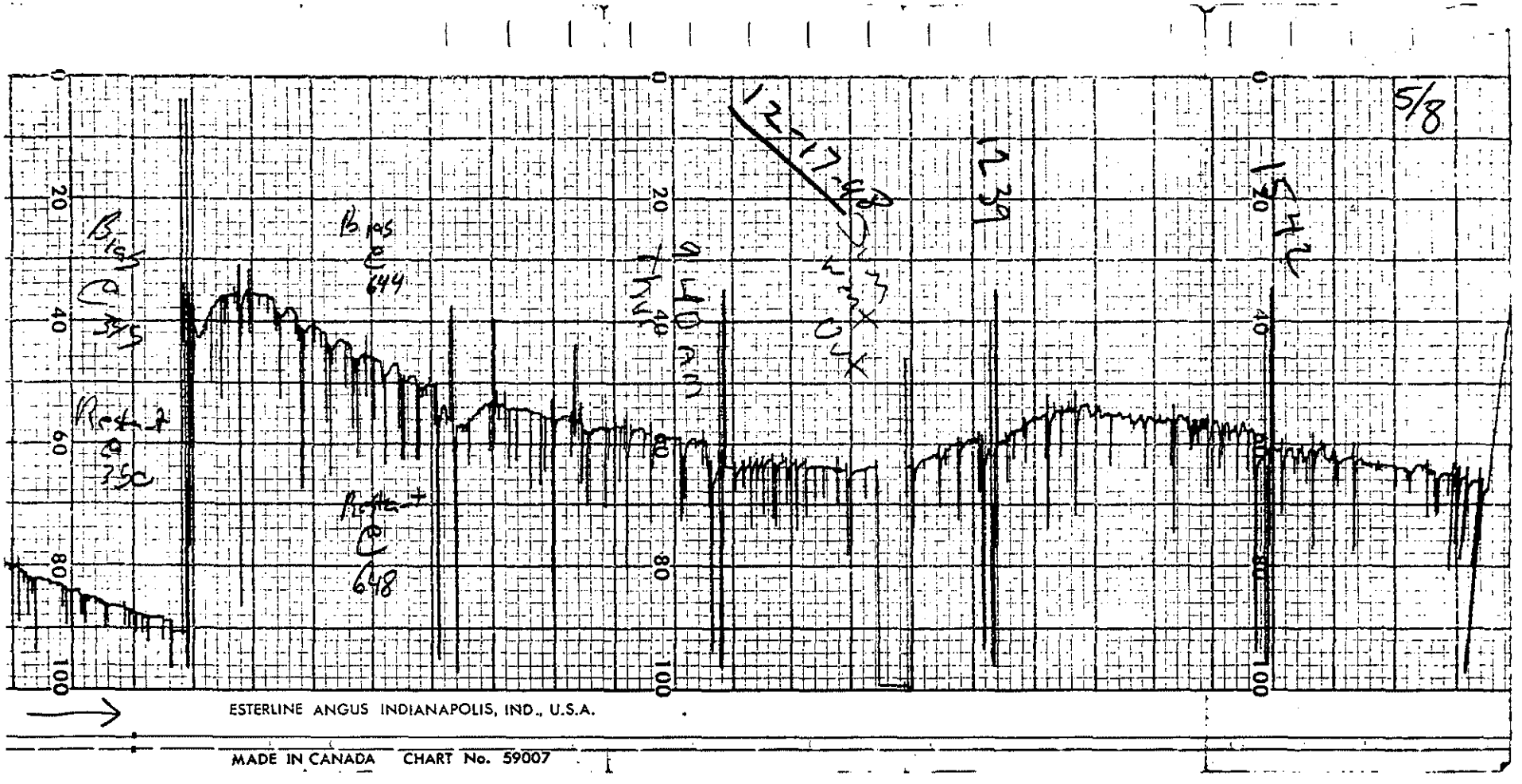
5/8
ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
MADE IN CANADA CHART No. 59007


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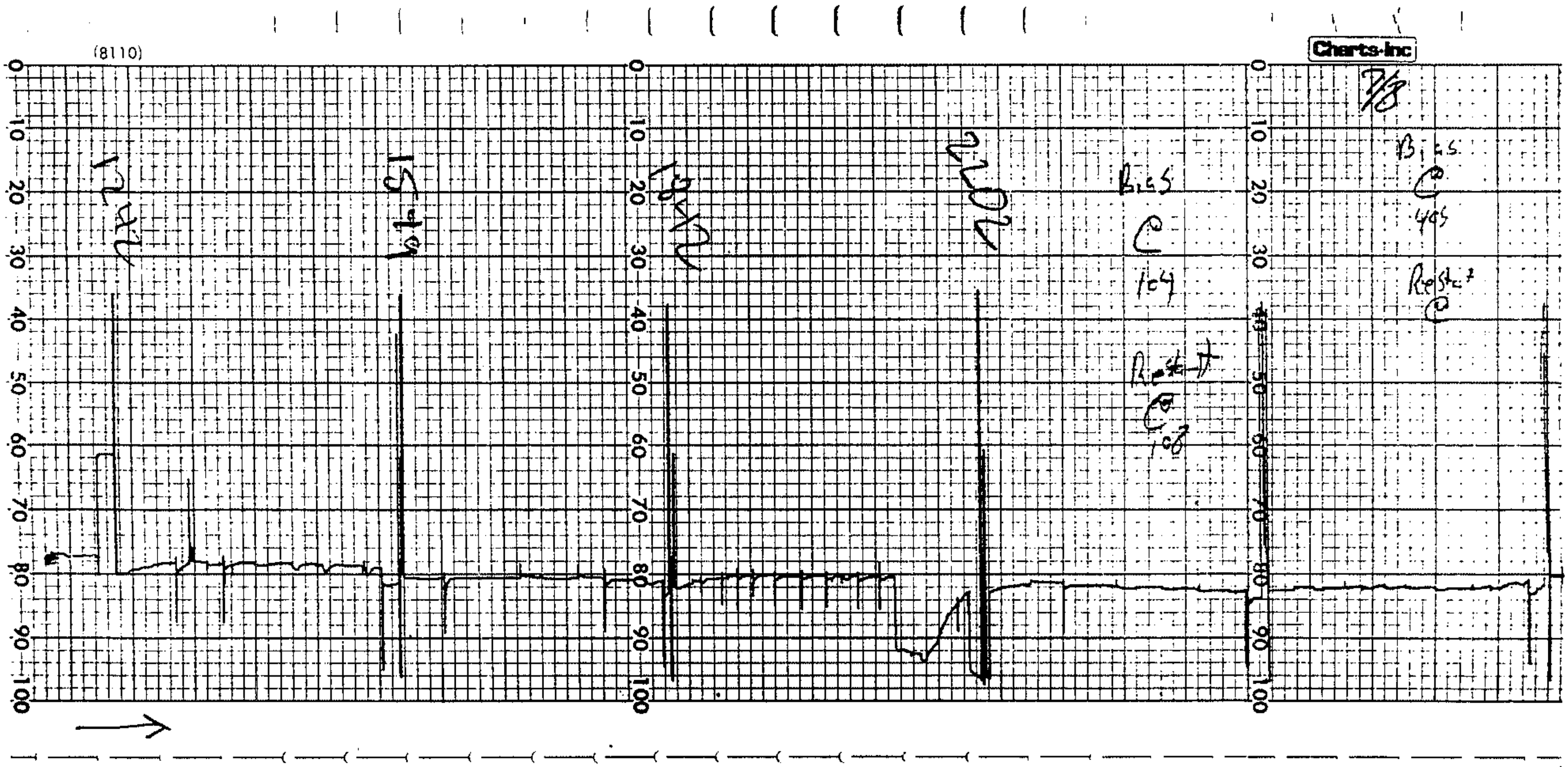

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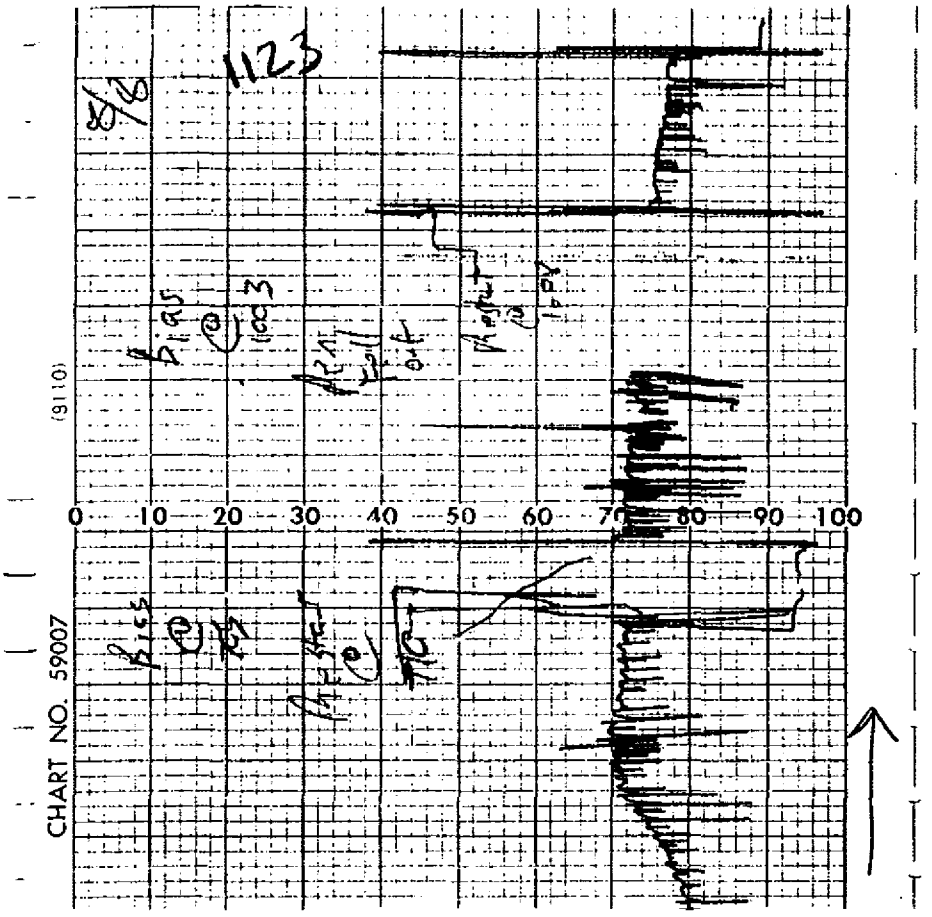
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60
70
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CHART NO. 59007

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

14

10 22 98

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENGØ1

TO:
DAVID ROSSMAN
HORIZON ENG'G/INFRARED NW
13585 NE WHITAKER WAY
PORTLAND, OR 97230-

DATE: 10/09/98
002241 - 9/14/98

CUSTOMER ORDER NUMBER: ØØ2241

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CAØ11Ø9	Carbon dioxide	5.98 ± Ø.Ø6 %	SRM 1674B
	Nitric oxide	69.9 ± Ø.7 ppm	SRM 1684b
	Carbon monoxide	291.2 ± 2.9 ppm	SRM 2636
	Propane	27.92 ± Ø.28 ppm	SRM 1667B
	Nitrogen,O2-Free	Balance	
	NOx	69.9 ppm	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance, NIST Weight Report No. MMAP 232.09/202491.

Analyst: M.S. Calhoun

Approved: J.T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

12-01
#23
PO 2352
of 15250

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENGØ1
TO:
DAVID ROSSMAN
HORIZON ENG'G/INFRARED NW
13585 NE WHITAKER WAY
PORTLAND, OR 97230-

DATE: 11/20/98

CUSTOMER ORDER NUMBER: 002352

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC66249	Carbon dioxide	12.44 ± Ø.12 %	SRM 1675B
	Nitric oxide	124.9 ± 1.2 ppm	SRM 1685b
	Carbon monoxide	493 ± 5 ppm	SRM 168Øb
	Propane	5Ø.5 ± Ø.5 ppm	SRM 1667b
	Nitrogen,O2-Free	Balance	
	NOx	124.9 ppm	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance, NIST Weight Report No. MMAP 232.09/202491.

Analyst: _____ M.S. Calhoun

Approved: _____ J.T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (909) 653-6780 • FAX (909) 653-2430

12-01-98
#35
PO 2334
4/10/5/98

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENGØ1
TO:
DAVID ROSSMAN
HORIZON ENG'G/INFRARED NW
13585 NE WHITAKER WAY
PORTLAND, OR 97230-

DATE: 11/20/98

CUSTOMER ORDER NUMBER: 2334

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC53889	Carbon dioxide	21.79 ± Ø.22 %	SRM 1675B
	Nitric oxide	184.8 ± 1.8 ppm	SRM 1685b
	Carbon monoxide	877 ± 9 ppm	SRM 1681b
	Propane	86.4 ± Ø.9 ppm	SRM 1668b
	Nitrogen,O2-Free	Balance	
	NOx	184.8 ppm	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance, NIST Weight Report No. MMAP 232.09/202491.

Analyst: M.S. Calhoun

Approved: J.T. Marrin

CALIBRATION DATA

Source Test Control Box Calibrations

file/date	7MB97423.WB1				
Method	EPA #5.3.2 & 5.6				
Location	Horizon Shop	Std M	#2		
Meter Box ID	7	Pb=	29.79	(in Hg)	
Meter ID	2962453	Ta=	60	(oF)	
calibrated	cdb	LeakCheck			
Assigned		Date	12/2/98		
		Rate	0.00	in/min	

	Old	New	Change
	10-28-98	12/2/98	(+/-)
Y=	0.99083	0.97729	-1.4%
dH@=	1.75911	1.75783	-0.1%

777777777777			Standard		Field		Standard	Meter	Field	Meter			Time			Allowable	Tolerance
777777777777	VAC	dH	Meter	Net	Meter	Net	Tw	Tw	Tdi	Tdo	To	Tm	t			Y	dH@
777777777777	(in Hg)	(inH2O)	(ft3)	(ft3)	(ft3)	(ft3)	(oF)	(oR)	(oF)	(oF)	(oR)	(oR)	(min)	Y	dH@	0.020	0.20
Initial	16.0	4.00	435.3840	6.2540	295.2300	6.3320	60.0	520.5	60.0	60.0	520.0	520.3	5.583	0.97756	1.77830	0.000	0.02
Final			441.6380		301.5620		61.0		61.0	60.0							
Initial	18.0	3.00	441.8720	6.2600	301.7920	6.3600	61.0	521.0	61.0	60.0	520.5	521.0	6.467	0.97704	1.78741	0.000	0.03
Final			448.1320		308.1520		61.0		62.0	61.0							
Initial	20.0	2.00	448.2470	6.1030	308.2710	6.2050	63.0	523.0	62.0	61.0	521.0	522.0	7.633	0.97686	1.75862	0.000	0.00
Final			454.3500		314.4760		63.0		64.0	61.0							
Initial	10.0	1.00	454.8550	6.0600	314.9900	6.1820	63.0	523.5	63.0	61.0	522.0	523.8	10.733	0.97832	1.76328	0.001	0.01
Final			460.9150		321.1720		64.0		68.0	63.0							
Initial	11.0	0.50	461.0320	6.5130	321.2880	6.6920	64.0	524.5	67.0	63.0	524.5	527.0	16.033	0.97669	1.70152	0.001	0.06
Final			467.5450		327.9800		65.0		72.0	66.0							
														0.97729	1.75783	0.001	0.02

Method	EPA #5.3.2 & 5.6				
Location	Horizon Shop				
Meter Box ID	7	Pb=	29.60	(in Hg)	
Meter ID	None	Ta=	59	(oF)	
calibrated	kds	LeakCheck			
Assigned	Van II	Date	1-11-99		
		Rate	0.00	in/min	

	Old	New	Change
	12/2/98	1-11-99	(+/-)
Y=	0.97729	0.98126	0.4%
dH@=	1.75783	1.77045	0.7%

777777777777			Standard		Field		Standard	Meter	Field	Meter			Time			Allowable	Tolerance
777777777777	VAC	dH	Meter	Net	Meter	Net	Tw	Tw	Tdi	Tdo	To	Tm	t			Y	dH@
777777777777	(in Hg)	(inH2O)	(ft3)	(ft3)	(ft3)	(ft3)	(oF)	(oR)	(oF)	(oF)	(oR)	(oR)	(min)	Y	dH@	0.020	0.20
Initial	14.1	4.00	612.1320	6.1960	630.4060	6.2820	59.0	519.0	61.0	58.0	518.5	520.8	5.550	0.97990	1.79648	0.001	0.03
Final			618.3280		636.6880		59.0		65.0	59.0							
Initial	13.6	3.00	620.3430	6.4500	638.7450	6.5630	60.0	520.0	65.0	59.0	519.5	523.0	6.370	0.98114	1.64103	0.000	0.13
Final			626.7930		645.3080		60.0		68.0	60.0							
Initial	15.6	2.00	627.7330	6.9860	646.2670	7.1330	60.0	520.5	67.0	60.0	520.5	524.0	9.000	0.98110	1.86163	0.000	0.09
Final			634.7190		653.4000		61.0		68.0	61.0							
Initial	11.7	1.00	635.5570	5.6340	654.2720	5.7650	60.0	520.5	67.0	61.0	521.5	524.8	10.150	0.98281	1.81677	0.002	0.05
Final			641.1910		660.0370		61.0		69.0	62.0							
Initial	11.5	0.50	641.7580	5.4550	660.6220	5.6050	61.0	521.0	68.0	63.0	523.5	526.0	13.600	0.98136	1.73632	0.000	0.03
Final			647.2130		666.2270		61.0		69.0	64.0							
														0.98126	1.77045	0.001	0.07

file/date	4MB96918.WB1
Method	EPA #5.3.2 & 5.6
Location	Horizon Shop
Meter Box ID	4
Meter ID	None
calibrated	kds
Assigned	Van II

Std M #2
Pb= 30.21 (in Hg)
Ta= 59 (oF)
LeakCheck
Date 12-08-98
Rate 0.00 in/min

	Old 6-22-98	New 12-08-98	Change (+/-)
Y=	0.99556	0.98968	-0.6%
dH@=	1.72084	1.76899	2.8%

	VAC (in Hg)	dH (inH2O)	Standard Meter (ft3)	Net (ft3)	Field Meter (ft3)	Net (ft3)	Standard Meter Tw (oF)	Tw (oR)	Field Meter Tdi (oF)	Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Allowable Tolerance Y 0.020	dH@ 0.20
Initial	11.5	4.00	469.1090	6.0830	956.6640	6.0800	59.0	519.0	59.0	58.0	518.5	519.5	5.480	0.99180	1.78044	0.002	0.01
Final			475.1920		962.7440		59.0		62.0	59.0							
Initial	11.0	3.00	476.0260	6.3740	963.5790	6.3930	59.0	519.5	62.0	59.0	519.5	521.5	6.630	0.99361	1.78018	0.004	0.01
Final			482.4000		969.9720		60.0		65.0	60.0							
Initial	14.4	2.00	498.3710	6.0750	986.1030	6.1710	63.0	523.0	71.0	63.0	524.0	528.0	7.800	0.98904	1.81699	0.001	0.05
Final			504.4460		992.2740		63.0		73.0	65.0							
Initial	14.0	1.00	491.2330	6.0950	978.8730	6.1840	62.0	522.0	69.0	62.0	522.0	525.8	10.750	0.99028	1.71433	0.001	0.05
Final			497.3280		985.0570		62.0		70.0	62.0							
Initial	12.7	0.50	505.6230	6.0910	993.4500	6.2230	62.0	522.5	70.0	65.0	525.5	525.8	15.400	0.98368	1.75303	0.006	0.02
Final			511.7140		999.6730		63.0		62.0	66.0							
														0.98968	1.76899	0.003	0.03

Method	EPA #5.3.2 & 5.6
Location	Horizon Shop
Meter Box ID	4
Meter ID	None
calibrated	cdb
Assigned	Van II

Std M #2
Pb= 30.05 (in Hg)
Ta= 76 (oF)
LeakCheck
Date 6-22-98
Rate 0.00 in/min

	Old 06-10-98	New 6-22-98	Change (+/-)
Y=	0.98913	0.99556	0.7%
dH@=	1.70085	1.72084	1.2%

	VAC (in Hg)	dH (inH2O)	Standard Meter (ft3)	Net (ft3)	Field Meter (ft3)	Net (ft3)	Standard Meter Tw (oF)	Tw (oR)	Field Meter Tdi (oF)	Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Allowable Tolerance Y 0.020	dH@ 0.20
Initial	17.0	4.00	454.5450	6.3400	153.2320	6.3500	76.0	535.5	76.0	76.0	536.0	536.3	5.600	0.99013	1.77204	0.005	0.05
Final			460.8850		159.5820		75.0		77.0	76.0							
Initial	18.0	3.00	461.1540	6.4500	159.8620	6.4700	74.0	533.5	77.0	76.0	536.0	537.0	6.533	0.99614	1.73475	0.001	0.01
Final			467.6040		166.3320		73.0		79.0	76.0							
Initial	19.5	2.00	467.8530	6.1700	166.5820	6.2270	75.0	535.0	78.0	76.0	536.5	538.3	7.700	0.99201	1.76376	0.004	0.04
Final			474.0230		172.8090		75.0		82.0	77.0							
Initial	21.0	1.00	474.1680	6.0630	172.9560	6.0990	77.0	536.0	80.0	77.0	537.5	539.5	10.433	0.99815	1.67990	0.003	0.04
Final			480.2310		179.0550		75.0		83.0	78.0							
Initial	23.0	0.50	480.4130	6.2340	179.2550	6.2700	72.0	536.0	82.0	78.0	538.5	540.5	15.067	1.00138	1.65377	0.006	0.07
Final			486.6470		185.5250		80.0		83.0	79.0							
														0.99556	1.72084	0.004	0.04

Pitot Calibration Calculations

Date 17-Sep-98 Pb= 29.92 in Hg cdb
File pt98317 Ta= 541.0 R
Method #2 sec 4 Location Whitaker Shop

Pitot	Tested Last	[Cp] New	[S]	[Cp] Old	[%] Change
gs3-1	8/27/98	0.79013	0.00685	0.79057	-0.1%
ss3-2	8/27/98	0.80537	0.00650	0.80626	-0.1%
ss3-3	8/27/98	0.79136	0.00531	0.80551	-1.8%
**wc3-4	3/20/98	0.80699	0.00511	0.80699	0.0%
ss3-5	8/27/98	0.79800	0.00284	0.80696	-1.4%
ss3-6	8/27/98	0.80133	0.00742	0.80438	-0.4%
ss3-7	8/27/98	0.80168	0.00502	0.79250	1.2%
ss3-8	8/27/98	0.79295	0.00112	0.79150	0.2%
ss4-1	8/27/98	0.79801	0.00095	0.80105	-0.4%
ss4-2	8/27/98	0.80288	0.00597	0.79084	0.8%
ss4-3	8/27/98	0.80025	0.00404	0.80350	-0.4%
ss4-4	8/27/98	0.79877	0.00476	0.79722	0.2%
ss4-5	8/27/98	0.79411	0.00394	0.79915	-0.6%
	Average	0.79881	0.00466	0.80027	-0.18%

	dPp	dPs	Cp	dS	Avg Cp	S
gs3-1	1.250	1.950	0.79263	0.00250	0.79013	0.00685
Pass	0.950	1.450	0.80133	0.01120		
8/27/98	0.390	0.620	0.78518	0.00495		
cdb	0.380	0.610	0.78138	0.00875		
ss3-2	1.325	2.050	0.79591	0.00946	0.80537	0.00650
Pass	1.050	1.600	0.80199	0.00338		
8/27/98	0.430	0.650	0.80522	0.00015		
cdb	0.410	0.600	0.81837	0.01300		
ss3-3	1.275	2.050	0.78075	0.01061	0.79136	0.00531
Pass	1.050	1.625	0.79580	0.00443		
8/27/98	0.430	0.670	0.79311	0.00174		
cdb	0.420	0.650	0.79580	0.00443		
**wc3-4	1.250	1.875	0.80833	0.00134	0.80699	0.00511
Pass	0.880	1.300	0.81453	0.00754		
3/20/98	0.570	0.880	0.79077	0.01022		
cdb	0.380	0.540	0.80833	0.00134		
ss3-5	1.250	1.950	0.79263	0.00337	0.79800	0.00284
Pass	1.000	1.525	0.80168	0.00568		
8/27/98	0.400	0.620	0.79519	0.00082		
cdb	0.380	0.590	0.79451	0.00149		
ss3-6	1.250	1.950	0.79263	0.00870	0.80133	0.00742
Pass	1.050	1.600	0.80199	0.00066		
8/27/98	0.400	0.620	0.79519	0.00615		
cdb	0.380	0.580	0.81552	0.01418		
ss3-7	1.200	1.875	0.79200	0.00968	0.80168	0.00502
Pass	0.950	1.450	0.80133	0.00035		
8/27/98	0.420	0.630	0.80833	0.00665		
cdb	0.410	0.620	0.80507	0.00338		
ss3-8	1.250	1.950	0.79263	0.00032	0.79295	0.00112
Pass	1.000	1.550	0.79519	0.00224		
8/27/98	0.410	0.640	0.79239	0.00056		
cdb	0.390	0.610	0.79159	0.00136		
ss4-1	1.300	2.000	0.79816	0.00016	0.79801	0.00095
Pass	0.970	1.500	0.79611	0.00189		
8/27/98	0.430	0.660	0.79909	0.00109		
cdb	0.410	0.630	0.79865	0.00065		
ss4-2	1.300	2.000	0.79816	0.00471	0.80288	0.00597
Pass	1.050	1.550	0.81462	0.01195		
8/27/98	0.390	0.600	0.79816	0.00471		
cdb	0.388	0.560	0.80035	0.00252		
ss4-3	1.300	2.000	0.79816	0.00209	0.80025	0.00404
Pass	1.100	1.700	0.79036	0.00390		
8/27/98	0.390	0.600	0.79816	0.00209		
cdb	0.380	0.540	0.80833	0.00808		
ss4-4	1.275	2.000	0.79045	0.00831	0.79877	0.00476
Pass	1.100	1.650	0.80833	0.00957		
8/27/98	0.410	0.630	0.79865	0.00011		
cdb	0.370	0.570	0.79763	0.00114		
ss4-5	1.275	2.000	0.79045	0.00365	0.79411	0.00394
Pass	1.050	1.600	0.80199	0.00789		
8/27/98	0.410	0.640	0.79239	0.00172		
cdb	0.390	0.610	0.79159	0.00251		

Pitot	Tested Last	[Cp] New	[S]	[Cp] Old	[%] Change
ss4-6	8/27/98	0.79627	0.00194	0.78592	1.3%
ss4-7	8/27/98	0.80423	0.00452	0.79533	1.1%
ss5-2	9/11/98	0.79588	0.00780	0.79438	0.2%
ss5-3	9/11/98	0.80139	0.00974	0.80203	-0.1%
ss5-4	8/31/98	0.78090	0.00347	0.79128	-1.3%
ss5-5	8/31/98	0.79984	0.00876	0.79501	0.6%
ss5-6	9/11/98	0.80103	0.00992	0.79307	1.0%
ss5-7	8/28/98	0.80803	0.00210	0.80270	0.7%
ss5-8	8/28/98	0.79984	0.00533	0.79870	0.1%
ss5-9	8/31/98	0.80336	0.00779	0.80336	0.0%
ss7-1	9/2/98	0.80797	0.00883	0.80781	0.0%
ss7-2	9/2/98	0.80057	0.00388	0.79447	0.8%
ss7-3	9/2/98	0.79767	0.00533	0.81022	-1.6%
	Average	0.79987	0.00636	0.79724	0.33%

	dPp	dPs	Cp	dS	Avg Cp	S
ss4-6	1.300	2.000	0.79816	0.00160	0.79627	0.00194
Pass	1.100	1.700	0.79036	0.00009		
8/27/98	0.410	0.640	0.79239	0.00388		
cdb	0.390	0.600	0.79816	0.00190		
ss4-7	1.300	1.950	0.80833	0.00410	0.80423	0.00452
Pass	1.000	1.550	0.79519	0.00904		
8/27/98	0.420	0.630	0.80833	0.00410		
cdb	0.410	0.620	0.80507	0.00084		
ss5-2	1.300	2.050	0.78837	0.00751	0.79588	0.00780
Pass	1.075	1.600	0.81148	0.01560		
9/11/98	0.440	0.690	0.79056	0.00532		
cdb	0.430	0.670	0.79311	0.00277		
ss5-3	1.300	2.025	0.79322	0.00817	0.80139	0.00974
Pass	1.100	1.600	0.82087	0.01947		
9/11/98	0.430	0.660	0.79909	0.00230		
cdb	0.410	0.640	0.79239	0.00900		
ss5-4	1.300	2.100	0.77893	0.00197	0.78090	0.00347
Pass	1.100	1.750	0.78490	0.00400		
8/31/98	0.430	0.700	0.77593	0.00497		
cdb	0.420	0.670	0.78363	0.00294		
ss5-5	1.250	2.000	0.76266	0.01698	0.79984	0.00876
Pass	1.050	1.550	0.81462	0.01518		
8/31/98	0.430	0.660	0.79909	0.00055		
cdb	0.420	0.640	0.80199	0.00235		
ss5-6	1.300	2.050	0.76837	0.01266	0.80103	0.00992
Pass	1.100	1.600	0.82087	0.01983		
9/11/98	0.430	0.660	0.79909	0.00194		
cdb	0.420	0.650	0.79580	0.00523		
ss5-7	1.200	1.800	0.80833	0.00030	0.80803	0.00210
Pass	0.890	1.350	0.80363	0.00420		
8/28/98	0.410	0.610	0.81164	0.00361		
cdb	0.400	0.600	0.80833	0.00030		
ss5-8	1.325	2.050	0.79591	0.00392	0.79984	0.00533
Pass	1.050	1.600	0.80199	0.00216		
8/28/98	0.430	0.670	0.79311	0.00673		
cdb	0.420	0.630	0.80833	0.00850		
ss5-9	1.275	1.975	0.79544	0.00792	0.80336	0.00779
Pass	0.980	1.500	0.80021	0.00315		
8/31/98	0.410	0.610	0.81164	0.00828		
cdb	0.400	0.590	0.81515	0.01179		
ss7-1	1.200	1.850	0.79733	0.01063	0.80797	0.00883
Pass	0.950	1.450	0.80133	0.00663		
9/2/98	0.420	0.620	0.81462	0.00688		
cdb	0.410	0.600	0.81837	0.01041		
ss7-2	1.300	2.000	0.79816	0.00241	0.80057	0.00388
Pass	1.000	1.500	0.80833	0.00776		
9/2/98	0.390	0.600	0.79816	0.00241		
cdb	0.370	0.570	0.79763	0.00295		
ss7-3	1.250	1.950	0.79263	0.00503	0.79767	0.00533
Pass	1.000	1.500	0.80833	0.01067		
9/2/98	0.400	0.620	0.79519	0.00248		
cdb	0.380	0.590	0.79451	0.00316		

Note: ** Not calibrated; will calibrate when needed.

Shortridge Instruments, Inc.
7855 EAST REDFIELD ROAD SCOTTSDALE, ARIZONA 85260
TELEPHONE (602) 991-6744 FAX (602) 443-1267

CERTIFICATE OF CALIBRATION

INSTRUMENT AirData Multimeter

MODEL ADM-870 SERIAL NO M94064

TEST BY L. Laubmeier DATE 12-17-96

This is to certify that this instrument has been calibrated using instrumentation which is traceable to masters at the National Institute of Standards and Technology. Quality Assurance Program and calibration procedures meet the requirements for 10CFR50, Appendix B; 10CFR21; ANSI/N45.2; and MIL-STD45662A.

CERTIFIED BY Ernest R. Shortridge

CERTIFICATION OF NIST TRACEABILITY

Calibration equipment and standards used by Shortridge Instruments, Inc. are traceable to the National Institute of Standards & Technology. The Calibration Certification test report numbers are: differential and absolute pressure M4212 (dated 8/93), TN-251820-93 (dated 6/93) and 822/255136-95 (dated 3/95); temperature - 88024 (dated 10/90). Calibration is performed in conformance with 10CFR50, Appendix B; ANSI/N45.2; MIL-STD-45662A and manufacturer's specifications.

Calibration equipment is calibrated using Shortridge Instruments' Inc. Calibration Test Standard Master Meter Serial Number M96455 (cal date 08/20/96), M96452 (cal date 09/25/96), M89216 (cal date 08/03/95) or M89218 (cal date 09/12/95) certified yearly through an outside testing facility which is directly traceable to NIST.

All AirData Multimeters and AirData FlowMeters calibrated between the dates of June 20, 1996 and June 20, 1997 are included under this certification. All such meters are certified for accuracy when used with properly functioning accessories only.

CALIBRATION ACCURACY

Calibration accuracy of Shortridge Instruments, Inc. Calibration Master Meters as compared to AirData Multimeters or AirData FlowMeters being calibrated or recalibrated, is as follows:

Differential Pressure: Accuracy ratio for differential pressure is 4:1.

Master Meter: ± 0.50% of reading ± one count as compared with a NIST Traceable Calibration Standard with specified accuracy of ± 0.005% of reading ± 0.00003 psi (0.0008 in wc).

Test Meter: ± 2.0% of reading ± 0.0001 in wc.

Absolute Pressure: Accuracy ratio for absolute pressure is 4:1.

Master Meter: ± 0.50% of reading ± one count as compared with a NIST Traceable Calibration Standard with specified accuracy of ± 0.005% of reading ± 0.003 psi.

Test Meter: ± 2.0% of reading ± 0.1 in Hg.

Temperature: Accuracy ratio for temperature is 2:1.

Master Meter: ± 0.25°F as compared with a NIST Traceable Calibration Standard with specified accuracy of ± 0.10°F or better.

Test Meter: ± 0.5°F between 32°F and 212°F.

Air Flow: Accuracy ratio for the Electronic FlowHood is 2:1; for the Mechanical FlowHood it is 2:1 minimum.

Master Meter: ± 1.38% of reading ± 5.0 cfm. Air flow readout accuracy is the square root of the combined accuracies of the differential pressure, absolute pressure and temperature measurements by both the Master Meter and the FlowHood Test Stand Meter used for direct flow readout.

Test Meter: ± 3.0% of reading ± 5.0 cfm for the Electronic FlowHood. It is ± 3.0% of range (full scale) for the Mechanical FlowHood.

SHORTRIDGE INSTRUMENTS, INC.
7855 East Redfield Road Scottsdale, AZ 85260
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Thermocouple Calibration

Date:	24-Mar-98	Deviation	@60 F	7.8	Allowable Diff.	Pb=	29.88	In Hg	JDF
Next Calibration:	20-Sep-98	Limit	@212 F	10.1	Allowable Diff.	Ta=	70.0	oF	980324tc
			@325 F	11.8	Allowable Diff.				

		Ambient			Boiling, Water			Boiling, Oil			Average
	Probe/ID	Standard, F	Measured, F	Difference F	Standard, F	Measured, F	Difference F	Standard, F	Measured, F	Difference F	Difference F
Probe	3-1	33.2	33.0	0.2	211.4	211.4	0.0	357.8	358.4	-0.6	-0.13
Probe	3-2	33.2	33.4	-0.2	212.6	213.6	-1.0	352.8	356.8	-4.0	-1.73
Probe	3-3	34.8	34.8	0.0	210.6	212.6	-2.0	336.4	333.8	2.6	0.20
Probe	wc3-4	33.4	34.6	-1.2	212.2	214.2	-2.0	319.0	316.8	2.2	-0.33
Probe	3-5	33.2	33.4	-0.2	212.8	212.6	0.2	353.8	365.0	-11.2	-3.73
Probe	3-6	34.2	36.0	-1.8	211.6	213.8	-2.2	329.0	334.0	-5.0	-3.00
Probe	3-7	33.2	33.0	0.2	212.8	214	-1.2	358.6	356.8	1.8	0.27
Probe	3-8	33.2	33.6	-0.4	212.8	211.8	1.0	358.2	361.4	-3.2	-0.87
Probe	4-1	35.0	34.6	0.4	211.8	215	-3.2	346.6	346.8	-0.2	-1.00
Probe	4-2	34.6	33.0	1.6	211.2	208.2	3.0	332.4	328.4	4.0	2.87
Probe	4-3	35.4	36.2	-0.8	210.8	211.8	-1.0	332.8	336.0	-3.2	-1.67
Probe	4-4	34.4	33.2	1.2	210.6	211.6	-1.0	340.8	340.8	0.0	0.07
Probe	4-5	34.2	34.6	-0.4	210	212.2	-2.2	338.2	340.0	-1.8	-1.47
Probe	4-6	34.4	33.8	0.6	210.2	210.2	0.0	334.0	332.6	1.4	0.67
Probe	4-7	35.0	35.0	0.0	210.6	212.2	-1.6	336.4	340.4	-4.0	-1.87
Probe	5-2	33.0	33.8	-0.8	212.4	210	2.4	318.4	309.2	7.2	2.93
Probe	5-3	33.6	33.6	0.0	214.6	210.6	4.0	316.0	310.0	6.0	3.33
Probe	5-4	33.0	32.0	1.0	212.4	210.6	1.8	315.8	311.0	4.8	2.53
Probe	5-5	32.2	33.0	-0.8	211.4	210.4	1.0	314.4	314.0	0.4	0.20
Probe	5-6	33.0	32.6	0.4	213	210.8	2.2	315.4	313.8	1.6	1.40
Probe	5-7	32.4	32.4	0.0	214.4	211.2	3.2	319.6	317.4	2.2	1.80
Probe	5-8	33.0	32.8	0.2	212.4	211	1.4	324.4	321.8	2.6	1.40
Probe	5-9	33.0	32.6	0.4	212	211.2	0.8	317.4	320.0	-2.6	-0.47
Probe	7-1	33.8	32.6	1.0	210.8	210.8	0.0	313.0	315.8	-2.8	-0.60
Probe	7-2	33.8	33.0	0.6	211.8	211	0.8	318.6	318.6	0.0	0.47
Probe	7-3	33.2	33.6	-0.4	213.6	211	2.6	318.4	316.0	2.4	1.53
Probe	7-4	33.6	33.6	0.0	212.8	211.2	1.6	315.0	313.0	2.0	1.20
Probe	7-5	32.8	32.6	0.2	213.6	211.2	2.4	320.4	312.0	8.4	3.67
Probe	7-6	32.8	33.0	-0.2	213.4	211.6	1.8	312.4	311.8	0.6	0.73
Probe	10-1	33.6	33.6	0.0	211.8	211.8	0.0	317.2	315.6	1.6	0.53
Probe	10-2	33.8	33.2	0.6	213.8	211	2.8	315.4	316.2	-0.8	0.87
Probe	10-3	33.2	34.4	-1.2	212.2	212.4	-0.2	315.6	318.4	-2.8	-1.40
Pitot	11-S	34.2	33.6	0.6	212.4	214.2	-1.8	314.8	314.2	0.6	-0.20
Pitot	10-S	33.8	33.4	0.4	212.4	213.6	-1.4	325.2	319.0	6.2	1.73
	F3	36.0	34.6	1.4	210.4	211.8	-1.4	280.8	278.6	2.2	0.73
	F23	34.2	35.8	-1.6	210	212.6	-2.6	274.0	272.0	2.0	-0.73
	F51	34.0	34.2	-0.2	211.4	211.8	-0.4	319.0	320.0	-1.0	-0.53
	F84	35.4	33.8	1.6	211.2	213.6	-2.4	308.2	311.8	-3.6	-1.47
	F85	35.2	33.8	1.4	211.2	213	-1.8	306.8	304.2	2.6	0.73
	F100	34.0	34.0	0.0	212.2	211.8	0.4	318.8	316.6	2.2	0.87
	A1	33.2	32.6	0.6	210.8	211.6	-0.8	370.8	368.8	2.0	0.60
	A2	33.4	34.0	-0.6	212	211	1.0	370.4	367.4	3.0	1.13
	A3	33.2	33.8	-0.6	213	212	1.0	368.0	368.8	-0.8	-0.13
	A4	33.4	33.2	0.2	212.6	212	0.8	366.2	363.4	2.8	1.27
	A5	33.4	33.0	0.4	211.8	212.6	-0.8	364.8	362.8	2.0	0.53
	A6	33.2	33.8	-0.6	212.4	209.8	2.6	364.2	357.0	7.2	3.07
	B3	35.8	35.2	0.6	210.6	203.8	6.8	294.8	295.4	-0.6	2.27
	B7	36.2	35.0	1.2	211.2	201.6	9.6	287.4	290.6	-3.2	2.53
	B8	36.2	34.6	1.6	211.4	210.6	0.8	322.8	325.6	-2.8	-0.13
	B10	35.6	35.2	0.6	211.4	213.4	-2.0	312.8	314.8	-2.0	-1.13
	B11	36.2	35.4	0.8	211.2	208.4	2.8	328.0	328.6	-0.6	1.00
	B13	36.0	33.8	2.2	212	211.4	0.6	316.2	316.4	-0.2	0.87
	B14	35.6	34.3	1.3	211.4	213	-1.6	301.6	304.2	-2.4	-0.90
AVERAGE		34.0	33.8	0.2	211.9	211.4	0.5	326.9	326.5	0.5	0.4
				0.04%			0.07%			0.06%	
Hivol Dial Gauges											
9118		35.4	35	0.4							
D-2					211.6	211	0.6	320.6	326.0	-5.4	
D-5					211.4	210	1.4	322.0	330.0	-8.0	
D-7		35.2	35	0.2	211.4	206	5.4				
D-9					211.2	210	1.2	321.8	328.0	-6.2	
D-10		33.4	36	-2.6	210.6	212	-1.4				
D-14		36.2	32	4.2							

Standard Used Fluke 5895570

Thermocouple Indicator Calibration

Date: 4-20-98	Deviation	@32 F	7.4	Pb=	30.05 In Hg		drb
Next Calibration: 4-98	Limit	@212 F	10.1	Ta=	55.0 oF		TCINDm97.WB1
		@400 F	12.9				

Thermocouple Indicator	Channel	Measured, F	Standard, F	Deviation % absolute	Measured, F	Standard, F	Deviation % absolute	Measured, F	Standard, F	Deviation % absolute	Average Deviation, %
Dial multi-indicator	1	115	114.2	0.1	408	407.8	0.0	704	703.0	0.1	0.08
	2	109	107.4	0.3	301	301.0	0.0	705	703.2	0.2	0.15
	3	109	107.8	0.2	408	407.2	0.1	738	736.8	0.1	0.13
	4	96	94.2	0.3	292	292.0	0.0	739	737.0	0.2	0.16
	5	96	94.4	0.3	287	287.0	0.0	787	785.6	0.1	0.13
	6	101	100.0	0.2	361	360.4	0.1	788	785.4	0.0	0.10
	7	107	105.4	0.3	352	352.4	-0.0	855	854.4	0.0	0.09
	8	101	100.2	0.1	406	405.4	0.1	851	849.4	0.1	0.11
	9	102	100.6	0.2	366	364.2	0.2	707	705.6	0.1	0.20
	10	86	84.4	0.3	486	485.0	0.1	707	705.4	0.1	0.18
Omega trendicator	1	86	84.6	0.3	355	353.8	0.1	862	859.4	0.2	0.20
	2	86	84.6	0.3	450	447.8	0.2	768	766.8	0.1	0.20
	3	121	119.0	0.3	394	392.4	0.2	768	766.8	0.1	0.21
	4	121	119.0	0.3	408	406.4	0.2	689	687.4	0.1	0.22
	5	86	84.4	0.3	312	311.0	0.1	689	687.4	0.1	0.19
Fluke 6393007		93.2	93.6	-0.1	463.8	465.0	-0.1	912.8	913.4	-0.0	-0.08
Fluke 7029082		91	89.4	0.3	346	344.8	0.1	927.6	926.6	0.1	0.17
Meter Box 2	1	89	92.4	-0.6	214	214.4	-0.1	461	462.6	-0.2	-0.28
	2	75	77.2	-0.4	254	255.4	-0.2	429	431.0	-0.2	-0.28
	3	97	99.4	-0.4	246	246.8	-0.1	481	483.4	-0.3	-0.27
	4	99	101.2	-0.4	240	240.2	-0.0	410	408.2	0.2	-0.07
	5	95	94.8	0.0	269	269.6	-0.1	353	353.6	-0.1	-0.04
Meter Box 4	1	77	76.4	0.1	331	328.6	0.3	785	783.2	0.1	0.19
	2	95	95.8	-0.1	386	385.8	0.0	793	793.4	-0.0	-0.05
	3	95	96.0	-0.2	357	355.6	0.2	717	717.4	-0.0	-0.01
	4	81	81.2	-0.0	303	300.6	0.3	708	705.6	0.2	0.16
	5	80	79.2	0.1	324	322.2	0.2	787	785.8	0.1	0.16
Meter Box 5	1	104	104.6	-0.1	352	352.2	-0.0	746	744.2	0.1	0.01
	2			0.0	269	268.0	0.1			0.0	0.05
	3			0.0	279	278.6	0.1			0.0	0.02
	4	110	109.4	0.1	346	345.8	0.0	742	740.2	0.1	0.09
	5	107	107.8	-0.1	376	375.2	0.1	762	758.4	0.3	0.08
Meter Box 6	1	86	84.6	0.3	408	404.6	0.2	872	871.4	0.0	0.15
	2	86	84.6	0.3	460	459.6	0.0	777	776.2	0.1	0.12
	3	86	87.0	-0.2	460	459.2	0.1	777	774.8	0.2	0.03
	4	86	84.6	0.3	460	458.8	0.1	777	776.2	0.1	0.15
	5	86	84.2	0.3	460	458.6	0.2	777	775.6	0.1	0.20
Meter Box 7	1	79	80.2	-0.2	439	437.8	0.1	754	754.2	-0.0	-0.03
	2	93	92.6	0.1	381	378.4	0.3	755	755.8	-0.1	0.11
	3	93	92.8	0.0	457	456.4	0.1	825	826.4	-0.1	-0.00
	4	92	91.6	0.1	439	437.4	0.2	825	824.8	0.0	0.09
	5	92	92.0	0.0	388	388.0	0.0	772	772.0	0.0	0.00
Meter Box 8	1	94	93.6	0.1	401	398.6	0.3	918	917.2	0.1	0.14
	2	95	94.6	0.1	401	401.6	-0.1	918	917.6	0.0	0.01
	3	94	94.8	-0.1	402	401.8	0.0	918	919.2	-0.1	-0.07
	4	94	93.8	0.0	402	401.6	0.0	918	917.0	0.1	0.05
	5	93	91.8	0.2	402	403.0	-0.1	918	916.0	0.1	0.08
temp. control box 1	1			0.0			0.0			0.0	0.00
temp. control box 2	1	97	98.2	-0.2	318	320.0	-0.3	871	871.6	-0.0	-0.17
Van II Heater Controls	1			0.0	251	254.2	-0.4			0.0	-0.15
	2			0.0	256	261.4	-0.7			0.0	-0.25
	3			0.0	255.2	251.0	0.6			0.0	0.20
	4			0.0	260.6	253.2	1.0			0.0	0.35
				0.0			0.0			0.0	0.00
				0.0			0.0			0.0	0.00
				0.0			0.0			0.0	0.00
				0.0			0.0			0.0	0.00
AVERAGE		82.19	81.88	0.05	351.71	351.09	0.07	655.50	654.84	0.05	0.06

Standard used, fluke 5895570 calibrated 4-1-98 by Grant Eagle Co.

Stainless Steel Nozzle Size List
Horizon Engineering

"28Aug98
noz0898

Diameter	I.D. #	'Measurements (in.)			Average	Old Average	
1"	S-B01	0.9895	0.9875	0.9870	0.9880	*0.9852*	*0.003*
3/4"	S-C01	0.7530	0.7530	0.7545	0.7535	*0.7553*	*-0.002*
	S-C02	0.7520	0.7525	0.7520	0.7522	*0.7493*	*0.003*
5/8"	S-A01	0.6300	0.6300	0.6290	0.6297	*0.6362*	*-0.007*
	S-A02	0.6150	0.6190	0.6180	0.6173	*0.6175*	*0.000*
1/2"	S-801	0.5000	0.4990	0.4975	0.4988	*0.4968*	*0.002*
	S-802	0.5120	0.5125	0.5120	0.5122	*0.5165*	*-0.004*
	S-803	0.4990	0.5015	0.5000	0.5002	*0.5008*	*-0.001*
	S-804	0.4980	0.5020	0.5010	0.5003	*0.4995*	*0.001*
	S-805	0.4965	0.4990	0.4965	0.4973	*0.4968*	*0.001*
	S-806	0.5005	0.4980	0.5000	0.4995	*0.5030*	*-0.004*
	S-807	0.4905	0.4935	0.4910	0.4917	*0.4928*	*-0.001*
	S-808	0.4950	0.4950	0.4935	0.4945	*0.4990*	*-0.005*
	S-809	0.4975	0.4955	0.4935	0.4955	*0.4957*	*0.000*
7/16"	S-701	0.4320	0.4300	0.4315	0.4312	*0.4310*	*0.000*
	S-702	0.4670	0.4670	0.4685	0.4675	*0.4672*	*0.000*
	S-703	0.4375	0.4415	0.4395	0.4395	*0.4363*	*0.003*
3/8"	S-601	0.3680	0.3705	0.3700	0.3695	*0.3673*	*0.002*
	S-602	0.3955	0.3970	0.3950	0.3958	*0.3977*	*-0.002*
	S-603	0.3880	0.3915	0.3890	0.3895	*0.3867*	*0.003*
	S-604	0.3705	0.3695	0.3670	0.3690	*0.3677*	*0.001*
	S-605	0.3750	0.3755	0.3765	0.3757	*0.3752*	*0.000*
	S-606						
	S-607	0.3600	0.3640	0.3640	0.3627	*0.3638*	*-0.001*
	S-608	0.3620	0.3615	0.3605	0.3613	*0.368*	*-0.007*
	S-609	0.3705	0.3720	0.3715	0.3713	*0.374*	*-0.003*
	S-610	0.3780	0.3790	0.3795	0.3788	*0.3815*	*-0.003*
	S-611	0.3690	0.3670	0.3680	0.3680	*0.3762*	*-0.008*
	S-669	0.3760	0.3760	0.3765	0.3762	*0.3757*	*0.000*
	S-613	0.3550	0.3550	0.3560	0.3553	*0.3547*	*0.001*

Diameter	I.D. #	'Measurements (In.)			Average	Old Average	
5/16"	S-501	0.3000	0.2990	0.3025	0.3005	*0.2975*	*0.003*
	S-502	0.2995	0.3035	0.3025	0.3018	*0.3017*	*0.000*
	S-503	0.3100	0.3090	0.3025	0.3072	*0.3178*	*-0.011*
	S-504	0.2950	0.2990	0.2975	0.2972	*0.2985*	*-0.001*
	S-505	0.3000	0.2970	0.2965	0.2978	*0.2995*	*-0.002*
	S-506	0.2990	0.2980	0.2985	0.2985	*0.2998*	*-0.001*
	S-507	0.3070	0.3085	0.3080	0.3078	*0.3068*	*0.001*
1/4"	S-401	0.2445	0.2445	0.2460	0.2450	*0.2465*	*-0.002*
	S-402	0.2530	0.2490	0.2520	0.2513	*0.2538*	*-0.002*
	S-403	0.2450	0.2480	0.2460	0.2463	*0.2500*	*-0.004*
	S-404	0.2485	0.2525	0.2495	0.2502	*0.2525*	*-0.002*
	S-405	0.2495	0.2480	0.2480	0.2485	*0.2493*	*-0.001*
	S-406	0.2485	0.2480	0.2460	0.2475	*0.2487*	*-0.001*
	S-407	0.2455	0.2445	0.2460	0.2453	*0.2477*	*-0.002*
	S-408	0.2515	0.2490	0.2525	0.2510	*0.2507*	*0.000*
	S-409	0.2525	0.2500	0.2515	0.2513	*0.2513*	*0.000*
	S-410	0.2495	0.2515	0.2505	0.2505	*0.2500*	*0.001*
	S-411	0.2500	0.2500	0.2480	0.2493	*0.2463*	*0.003*
	S-412	0.2570	0.2585	0.2565	0.2573	*0.2568*	*0.001*
	S-413	0.2420	0.2455	0.2455	0.2443	*0.2452*	*-0.001*
	S-414	0.2430	0.2405	0.2415	0.2417	*0.2395*	*0.002*
3/16"	S-301	0.1850	0.1825	0.1835	0.1837	*0.1852*	*-0.002*
	S-302	0.1825	0.1835	0.1830	0.1830	*0.1835*	*-0.001*
	S-303	0.1680	0.1675	0.1680	0.1678	*0.1668*	*0.001*
	S-304	0.1740	0.1740	0.1745	0.1742	*0.1745*	*0.000*
	S-305	0.1650	0.1690	0.1685	0.1675	*0.1638*	*0.004*
1/8"	S-201	0.1240	0.1220	0.1245	0.1235	*0.1242*	*-0.001*

All nozzles must be within 0.004 in. for all diameters.

HORIZON ENGINEERING LLC

13585 N.E. Whitaker Way • Portland, OR 97230
Phone (503)255-5050 • Fax (503)255-0505
horizone@teleport.com

April 28, 1998
Horizon Shop
DRB

The new FSL digital barometer was reading 1018 hPa (30.147 in. Hg) at 13:55 while the weather station at PDX was reporting 1017.8 hPa (30.141 in. Hg).

KILN INFORMATION

DEPARTMENT OF FOREST PRODUCTS

OREGON STATE UNIVERSITY
105 Forest Research Laboratory . Corvallis, Oregon 97331-7402
United States of America
Telephone: 541-737-4210 FAX: 541-737-3385 milotam@frl.orst.edu

12-24-98

December 22, 1998

Dave Rossman
Horizon Engineering
13585 N.E. Whitaker Way
Portland, OR 97230

Dear Dave,

Enclosed is the data from the second part of the particulate/voc source tests. This data is summarized in the table below.

	Charge 1	Charge 2	Units
Run time	60.0	60.0	hours
Initial MC	38.3	37.7	% dry basis
Hot check MC	13.1 @ 46:38 12.0 @ 54:56	14.2 @ 46:08	% dry basis @ hr:min
Final MC (cold)	12.8	11.9	% dry basis
Charge size	2560	2560	board feet

The initial moisture content is based on 10 samples from each charge. A 3" section was cut from the middle of 10 different 16' boards and the oven-dry method was used to determine moisture content. The remaining two eight-foot sections from each board were put back into the kiln charge so the board footage was not affected.

The hot check is done by going into the kiln and using a meter to sample for moisture content. Since only the boards at the sides of the pile are accessible, the MC is usually a few percent lower than the charge average. One essentially uses this estimate to guess the charge average, then dry for enough additional time to reach the target moisture content. There is a downward spike on the kiln charts (Attachment 3) because the kiln is temporarily shut down during a moisture content check.

Attachment 1. Moisture data.

S:\Everyone\Milota\Willamette\MC_Dgflr1.xls

Douglas fir Charge #1
Willamette - Horizon - OSU
December 14, 1998

Initial Charge Moisture Content, Oven Dry Method

Board ID			Green Wt (gm)	OD Wt (gm)		Initial MC (%)
1			140.5	104.0		35.1
2			120.0	89.4		34.3
3			148.1	104.2		42.2
4			147.4	103.4		42.6
5			199.0	146.9		35.5
6			125.7	91.8		36.9
7			148.5	104.0		42.8
8			164.2	121.6		35.0
9			131.4	98.1		34.1
10			208.2	145.4		43.2
Sums			1533.0	1108.8		
Average						**38.3**

Near-End of Run Moisture Meter Check - 1

Run Time 46:38

Course	NE side	SE side	NW side	SW side
1	13.7	13.3	10.4	10.6
2	11.9	12.8	12.2	13.6
3	11.2	15.0	15.7	17.2
4	11.8	12.1	14.3	14.7
5	15.3	13.0	13.0	12.7
6	10.0	16.4	12.0	12.5
7	14.2	15.3	13.9	13.6
8	11.5	11.7	13.5	14.0
9	12.9	13.1	11.4	12.3
10	11.5			
Averages	12.4	13.6	12.9	13.5

13.1

Near-End of Run Moisture Meter Check

Run Tim 54:46

Course	NE side	SE side	NW side	SW side
1	10.3	13.3	9.1	9.9
2	9.7	12.6	12.3	11.3
3	10.8	10.9	15.3	13.6
4	13.4	14.4	14.1	13.2
5	9.3	10.9	12.0	12.4
6	13.9	13.8	11.1	13.7
7	8.6	15.1	11.6	13.0
8	11.2	13.3	11.2	11.3
9	11.9	10.1	11.6	
10	11.5			
Averages	11.1	12.7	12.0	12.3

12.0

S:\Everyone\Milota\Willamette\MC_Dgfir2.xls

Douglas fir Charge #2
Willamette - Horizon - OSU
December 16, 1998

Initial Charge Moisture Content, Oven Dry Method						
			Green	OD		Initial
Board			Wt	Wt		MC
ID			(gm)	(gm)		(%)
1			162.2	121.6		33.4
2			233.4	176.1		32.5
3			235.5	176.0		33.8
4			130.2	95.5		36.3
5			141.7	105.8		33.9
6			124.7	93.2		33.7
7			141.8	89.0		59.3
8			114.3	82.8		38.0
9			161.4	116.5		38.6
10			132.0	96.2		37.2
Sums						
Average						**37.7**

Near-End of Run Moisture Meter Check

Run Time 46:08

Course	NE side	SE side	NW side	SW side
1	14.7	14.9	15.2	14.5
2	13.4	15.3	11.8	17.9
3	13.5	13.8	15.7	13.7
4	15.1	14.1	11.7	14.1
5	16.0	15.6	14.4	12.0
6	13.7	10.9	12.6	13.6
7	15.7	14.6	14.0	14.6
8	13.6	13.4	15.1	14.7
9	12.0	12.8	17.0	13.9
10				
Averages	14.2	13.9	14.2	14.3

14.2

Cold MC checks

Douglas-fir Charge 1, 12-17-98

Course 1	Course 2	Course 3	Course 4	Course 5	
14.6	12.8	12.8	15.1		
13.5	14.1	15.0	12.8		
13.7	12.9	8.1	11.7		
11.5	12.6	13.1	13.9		
13.5	11.2	10.6	11.5		
14.0	10.4	12.6	14.6		
11.7	10.8	14.5	18.2		
8.2	11.4	12.0	16.9		
Average	**12.6**	**12.0**	**12.3**	**14.3**		**12.8**

Douglas-fir Charge 2, 12-21-98

Course 1	Course 2	Course 3	Course 4	Course 5	
17.6	12.5	14.7	13.1	6.6	
10.0	13.5	11.7	10.6	12.2	
9.6	10.5	9.9	12.5	14.7	
10.6	11.4	7.9	13.4	11.5	
10.8	9.3	15.1	12.6	13.3	
12.9	13.9	11.4	9.7	12.2	
13.4	11.1	10.8	11.2	14.5	
Average	**12.1**	**11.7**	**11.6**	**11.9**	**12.1**	**11.9**

Attachment 2. Kiln Schedule.

2x4 - 2x6
Summer

WILLAMETTE INDUSTRIES

Kiln No. 1

Schedule Number: 4

tep umber	Dry Bulb Setpoint	Wet Bulb Setpoint		Step Time (Hours)		D.A.L. (Auto Step)	Pan Reversal Time (Hours)	Fan Speed
1	120	180	0	2.0	2	0	3.0	90
2	155	145	10	22.0	24	0	3.0	100
3	165	150	15	22.0	46	0	3.0	100
4	170	155	15	22.0	68	0	3.0	100
5	180	170	10	22.0		0	3.0	90
6	0	0		0.0		0	0.0	0
7	0	0		0.0		0	0.0	0
8	0	0		0.0		0	0.0	0
9	0	0		0.0		0	0.0	0
10	0	0		0.0		0	0.0	0
				90				

Normal Valley Operation

utomatic Spray Control Step 1
loisture Content Setpoint 12

T_d	T_w	Time		Time
80	70	0-29	2hr ramp	0-2
155	145	10	10	2-12
165	150	12	15	12-24
170	~~150~~	24	24	24-48
180	165	12	15	48-end

Douglas-fir 1

Christine 979-2007 (cell)
924-5381 (office)

0 7462

T_d	T_w	Time
80	70	0-2
155	145	2-10
165	150	12-24
170	140	24-36
~~180~~	~~165~~	
170	140	36-52
180	165	52-60

Douglas-fir 2

Attachment 3. Kiln data.

Willamette Industries, Inc.
BMG Engineering - Western Region

12-31-98

2730 Pacific Blvd. S.E.
P.O. Box 907
Albany, OR 97321
Office: (541) 924-5380
Fax: (541) 928-1988

December 30, 1998

Mr. David Rossman, Horizon Engineering
13585 NE Whitaker Way
Portland, OR 97230

FAXED 12/30/98

RE: Process data for Douglas Fir Lumber Dry Kiln Source Testing at OSU
Vaughn Laminating Complex, Title V No. 200550
Warrenton Sawmill, Title V No. 04-0041

The following Douglas Fir lumber data is provided for inclusion into Willamette's dry kiln source test report. The data is representative of Vaughn Laminating Complex dry kiln operation, but will be used for Warrenton Sawmill's dry kiln emission factor verification.

Lumber specie:	Coastal and Cascade Douglas Fir
Lumber dimensions (wt. ave.):	2" x 6" x 16'
Lumber cut date:	11/9/98
Lumber transport to OSU date:	12/11/98
	transported under cover
	OSU stored under cover outside
Number of units:	2
Lumber pieces per unit:	Run 1 - 160
	3/4" stickers
	20 boards high, 8 boards wide
	Run 2 - 144
	3/4" stickers
	18 boards high, 8 boards wide
Lumber grade breakdown:	113 Pcs of #1
	183 Pcs of #2 and #3
	8 Pcs of Economy

(based on grades produced since May 1997 to October 1998)

Log source:	20 to 60 days old
	mixed decks from Willamette's Coburg sawmill
	including coastal and cascade Douglas Fir

Target oven-dry moisture content for dried lumber: 12%
Length of kiln schedule: 60 hours

Questions? Please call me at 541 924 5388.

Sincerely,

Jon Lund
Environmental Affairs

OREGON STATE UNIVERSITY
Department of Forest Products
Corvallis, OR 97331

To: Kate Krisor
Organization: Horizon Engineering
Fax Number: (503) 255-0505

DATE: February 12, 1999

Total pages 1

The schedules look fine except for the "spray" column.

Our spray was enabled for the entire cycle. Whether or not it was on depended on the wet-bulb temperature. In Attachment 3, the Spray column tells what % the valve was open.

Small kilns have a higher surface to volume ratio and often cannot hold the wet-bulb temperature without some steam spray compared to a larger kiln.

From: Michael R. Milota
Voice Number: (541) 737-4210
FAX Number: (541) 737-3385
E-Mail: MilotaM@frl.orst.edu

ADMINISTRATIVE

HORIZON ENGINEERING LLC

13585 N.E. Whitaker Way • Portland, OR 97230
Phone (503)255-5050 • Fax (503)255-0505
horizone@teleport.com

October 27, 1998

Mr. Jack Herbert
Oregon Department of Environmental Quality
2020 SW 4th, #400
Portland, OR 97201-4987

Ms. Gracia Castro
Lane Regional Air Pollution Authority
1010 Main Street
Springfield, OR 97477

Re: Source Testing: Willamette Industries, Inc.
for Warrenton, OR
for Vaughn, OR

This correspondence is notice that Horizon Engineering is to do source testing to confirm emission factors for the above-referenced and other facilities, scheduled for November 16-21 and December 14-19, 1998. The work will be done at the Forest Research Lab at Oregon State University in Corvallis. This will serve as the Source Test Plan unless changes are requested prior to the start of testing.

1. **Source(s) to be Tested:** Wellons Test Kiln (two exhausts)

2. **Purpose of the Testing:** Compliance with Title V Permit requirements at Warrenton and Vaughn Plants.

3. **Source Description:** The test kiln handles 2 mbf of lumber (4'x4'x16' unit). The kiln has two stacks, one exhausting at a time depending on fan direction and damper positions. The direction of flow (and the stack that is exhausting) changes every three hours (after an initial 1½-hour change). Exhaust is natural draft. The drying cycle for Douglas Fir is expected to be 60 hours and Hemlock is expected to be 50 hours.

4. **Pollutants to be Tested:** Particulate and VOC

11. **Horizon Engrg. Contacts:** David Rossman or
David Broderick
(503) 255-5050
Fax (503) 255-0505

12. **Source Site Personnel:** Jon Lund
(541) 924-5388
Fax (541) 928-1988

13. **Regulatory Contacts:** Jack Herbert (503) 229-5579 Fax (503) 229-5265; Gracia Castro (541) 726-2514 (541) 726-1205

14. **Applicable Process/Production Information:** Process operating data and production information that characterizes the source operation is considered to be: wood specie, lumber grade, dimensions of boards, stacking arrangement, start and end moisture content, and complete records of wet and dry bulb temperatures during the drying cycle. Process information is to be gathered by the source-site personnel and provided to Horizon for inclusion in the report.

15. **Control Device Operating Parameters:** NA

16. **Other Process Considerations,** including intermittent production, special feed or product, etc.: None known

17. **Administrative:** Unless notified prior to the start of testing, this test plan is considered approved for compliance testing of this source. A letter acknowledging receipt of this plan and agreement on the content (or changes as necessary) would be appreciated.

The Department and Lane Regional will be notified of any changes in source test plans prior to testing. It is recognized that significant changes not acknowledged, which could affect accuracy and reliability of the results, could result in test report rejection.

Source Test Reports will be prepared by Horizon Engineering and will include all results and example calculations, field sampling and data reduction procedures, laboratory analysis reports and QA/QC documentation. Source Test Reports will be submitted to you within 45 days of the completion of the fieldwork, unless another deadline has been stipulated. Willamette Industries, Inc. should send two (2) copies of the completed Source Test Report to you at the addresses above.

Any questions or comments relating to this test plan should be directed to David Rossman, David Broderick or David Bagwell.

Sincerely,

David Bagwell

cc: Jon Lund @ Willamette Industries, Inc., Albany, OR

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
11-17-98
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
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November 13, 1998

WILLAMETTE INDUSTRIES
ATTN JON LUND
PO BOX 791
ALBANY OR 97321

OREGON STATE UNIVERSITY
FOREST PRODUCTS DEPARTMENT
FRL 124
ATTN DR MIKE MILOTA
CORVALLIS OR 97331-5709

HORIZON ENGINEERING
ATTN DAVID R ROSSMAN
13585 NE WHITAKER WAY
PORTLAND OR 97230

Re: AQ Clatsop County
Permit No 04-0041
Willamette Industries' Warrenton Mill
Source-test plan for particulate and VOC emissions from lumber kiln

Dear Messrs Lund, Milota, and Rossman:

The Department received your test plan on October 28, 1998. Beth Moore showed it to me about November 5. She did not realize that I had not received it. You plan to test particulate and volatile organic compound (VOC) emissions from a Wellons lumber kiln at Oregon State University.

Each batch of lumber is to consist of a representative distribution of grades for the mill it represents. The lumber sizes are the most common sizes that each mill produces. You plan to test emissions from hemlock drying the week of November 16 to 20 and Douglas fir drying the week of December 14 to 19, 1998.

I understand that the hemlock test is to represent current operations and emissions at Warrenton and the Douglas-fir test is to represent Vaughn's conditions. Willamette Industries should document or describe as well as they can the origins and storage time and conditions of the timber and the storage time and conditions of the lumber. This letter deals with the applications of the test results to the Warrenton Mill. Lane Regional Air Pollution Authority has separate jurisdiction over tests for mills in their region.

I approve the test plan for the Department with the following additions that we discussed for application of the results to the Warrenton Mill's emissions.

1. The conditions of the lumber entering and leaving the kiln and the operation of the kiln shall be representative of the mill's lumber and their kiln operations.
2. Particulate and VOC sampling shall begin when or slightly before the kiln's vents open to ensure sampling initial emissions.
3. Sampling shall begin in each stack when or slightly before each exhaust cycle through that stack begins to catch any strong initial emissions. If testing indicates there are none, such sampling is not essential.
4. Each particulate sampling run may last during the entire drying of each lumber charge. The reason would be to minimize errors in measuring small sample masses. If the back-half sample masses are large, those of each type may be combined or not. The testers plan to use two sampling trains, one for each stack. To prevent overfilling the impingers, they can collect moisture and particulate samples from each sampling train during the run, while the other train is sampling the other stack.
5. The testers should inspect Method 7's back-half filter frequently enough to ensure that it is not overloading. It may need changing frequently to reduce sample loss or clogging. If the filter support collects matter, the testers should collect this matter in the back-half rinse.
6. The testers shall sample both stacks as fully as is feasible. Quality-assurance checks of the gas-concentration monitoring will be normal interruptions. Sampling may continue longer than normal at a sampling point if a tester's break or gas QA/QC requires the tester to be absent. The testers need not record flow data every five minutes unless the data vary significantly in that period at the same sampling location.

Thank you for helping clarify the test plan. Thane Jennings and Mark Fisher advised me for the Department.

If you have questions or information regarding the test, its plan, or its schedule, please call me at (503) 229-5579 or fax me at 229-5265.

Sincerely,

Jack Herbert
Source Testing Coordinator

JHH
c: Beth Moore:NWR