Revised-Oct 1-27-99

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

Project # 1079

SOURCE EVALUATION REPORT

WILLAMETTE INDUSTRIES, INC
Dry Kiln Particulate and VOC Emissions while Drying Hemlock

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

November 16-20, 1998

Prepared for

Warrenton Saw Mill
Willamette Industries, Inc.
Western Administrative & Sales Office
P.O. Box 907
Albany, OR 97321

by
David Broderick and
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 1/11/99

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

1/11/99

David R. Broderick Date
Team Leader

Introduction

Source tests were made November 16-20, 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 hemlock lumber. The testing was done to verify emission factors in the Title V operating permit for the Willamette Industries Warrenton saw mill.

David Broderick 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. Mr. Herbert and Steve Crane, also of ODEQ, visited the site during the testing.

Summary of Results

The test results are summarized in Table 1. Although the testing periods covered about 84% 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 91.5% 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

Hemlock Test Results, Wellons Dry Kiln, OSU

Test Dates: November 16-20, 1998

	Units	Cycle 1	Cycle 2	Average
Particulate (ODEQ M-7)	lb/mbf	0.046	0.055	0.051
	lb/hr	0.0017	0.0018	0.0018
	gr/dscf	0.0044	0.0034	0.0039
Volatile Organic Compounds				
TGOC, dry basis (EPA M-25A)	lbC/mbf	0.20	0.30	0.25
	lbC/hr	0.0081	0.0116	0.0099
	ppmC	80	87	84
Source Parameters				
Flow Rate, standard	dscf/min	56	76	66
Flow Rate, actual	acf/min	96	124	110
Exhaust Moisture	%	31	30	31
Exhaust Temperature	°F	161	159	160

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 2,000 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.

It is steam-heated with coils located above the lumber on either side of an axial fan. The fan reverses every four hours except initially (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 Coastal Hemlock were dried to less than 16% moisture, dry basis, over 50-hour cycles. The wood dried during testing was from the Willamette Industries Warrenton saw mill. The logs were 30 to 90 days old when cut on November 9, 1998. The lumber was shipped under cover the next day to OSU and stored outside under cover until the testing. The lumber was 16-foot sections of 2 x 8's. A total of about 2,045 board feet were dried in each 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

			°F		Hours		
Period	**Hour**	**Spray**	**Tdry**	**Twet**	**Ramp**	**Time**	**Fan Reversals**
1	0-8	Y	190	180	4	8	2
2	8-28	Y	190	152	10	20	4
3	28-38	Y	190	150	1	10	4
4	38-46	Y	190	154	1	8	4
5	46-54	Y	190	175	0.5	8	4
6	54-54.5	Y	100	70	0.5	0.5	4

Table 3

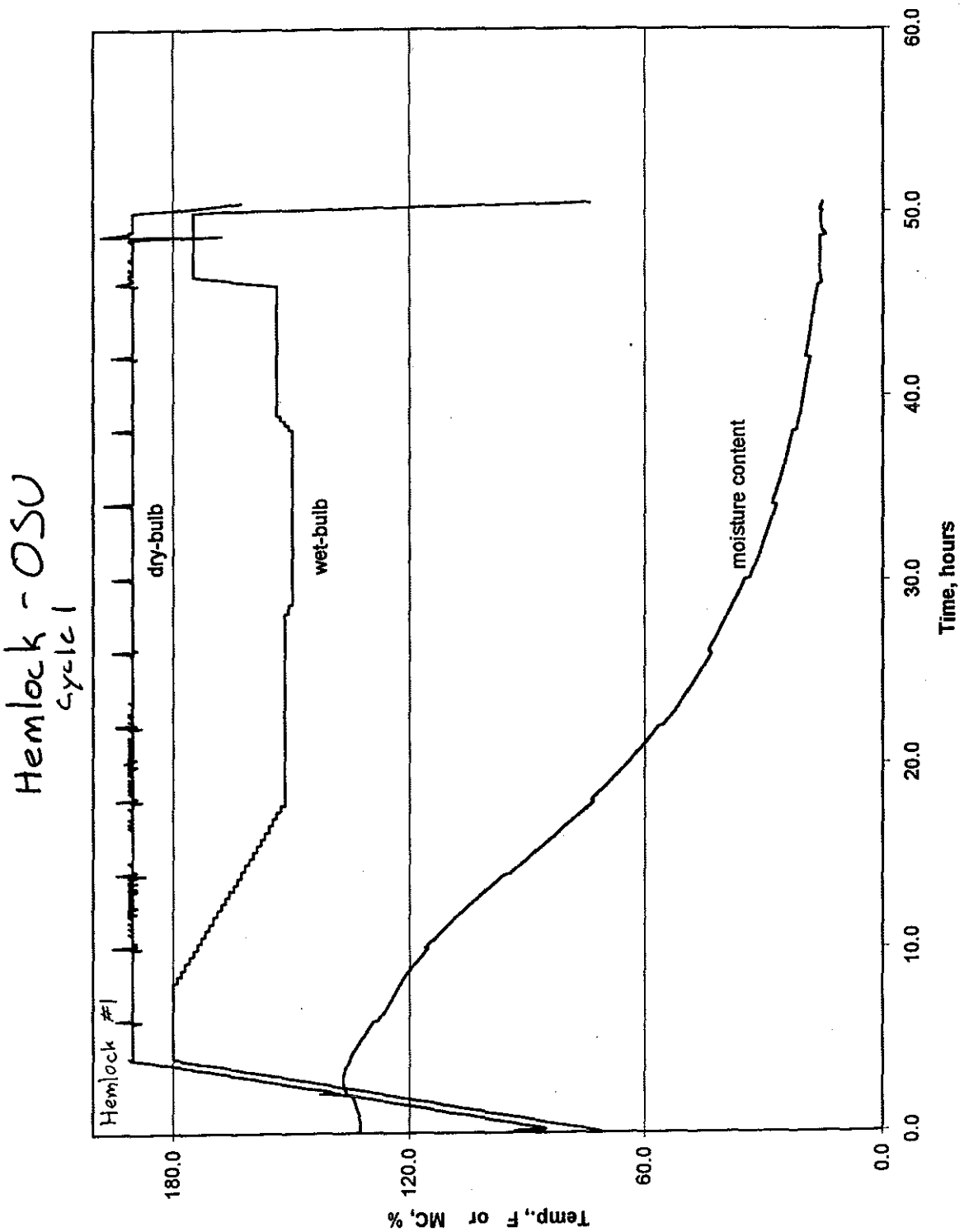
Drying Data Summary

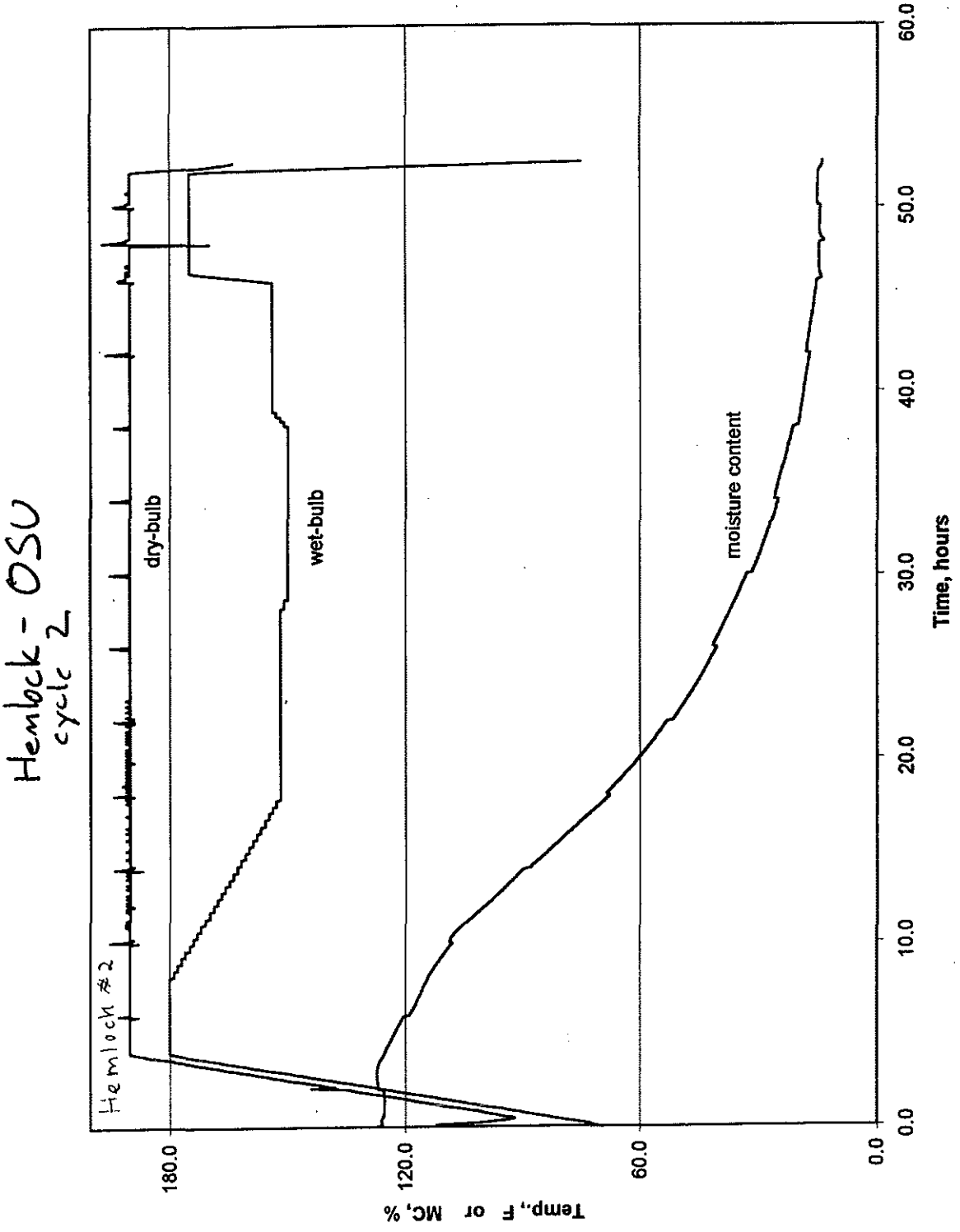
	Units	Charge 1	Charge 2
Run Time	Hours	50.5	52.5
Initial MC	% dry basis	134.3	127.6
Hot Check MC	% dry basis, hr:min	13.2 @ 48:04	13.8 @ 48:30
Final MC	% dry basis	15.0	13.4
Charge size	Board feet	2048	2048

Traverse Point Locations

Client	Weyerhaeuser Company		10-May-95 Date
Location	ESP #3, Outlet		smj/mdh By
Method	EPA 1		3esp595 File
Outer Circumference	Co ft		
Wall thickness	t in		
Inner Circumference	Ci ft		
INSIDE of FAR WALL to OUTSIDE of Nipple	F in	99.00	
INSIDE of NEAR WALL to OUTSIDE of Nipple	N in	9.00	
STACK WALL to to OUTSIDE of Nipple	N-t in		
DOWNstream Disturb	A in	91.0	
UPstream Disturb	B in	216.0	
Inner Diameter	Ds in	90.00	
Area	As sqin	6,362	
DOWNstream Ratio	A/Ds	1.01	
UPstream Ratio	B/Ds	2.40	
Traverse (Particulate)		24	
Recommended #Pts/Diameter		12	
Traverse (NON-Particulate)		16	
Recommended #Pts/Diameter		8	
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%	90.0	1.9	1.875	1.875	10.875	10 7 / 8
2	6.70%	90.0	6.0	6.000	6.000	15.000	15
3	11.81%	90.0	10.6	10.625	10.625	19.625	19 5 / 8
4	17.73%	90.0	16.0	16.000	16.000	25.000	25
5	25.00%	90.0	22.5	22.500	22.500	31.500	31 1 / 2
6	35.57%	90.0	32.0	32.000	32.000	41.000	41
7	64.43%	90.0	58.0	58.000	58.000	67.000	67
8	75.00%	90.0	67.5	67.500	67.500	76.500	76 1 / 2
9	82.27%	90.0	74.0	74.000	74.000	83.000	83
10	88.19%	90.0	79.4	79.375	79.375	88.375	88 3 / 8
11	93.30%	90.0	84.0	84.000	84.000	93.000	93
12	97.87%	90.0	88.1	88.125	88.125	97.125	97 1 / 8


Hemlock - OSU
cycle 1
Hemlock #1
dry-bulb
wet-bulb
moisture content
Temp., F or MC, %
Time, hours
180.0
120.0
60.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0


Hemlock - OSU
cycle 2
Hemlock #2
dry-bulb
wet-bulb
moisture content
Temp., F or MC, %
Time, hours
180.0
120.0
60.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0

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 four hours to the exhausting stack. For the PM testing one set of filters and glassware were used on each exhaust, keeping the same sample gear together for each individual stack over the entire cycle. The filter and acetone weights were allocated to each run on a sample weight basis.

Problems During Run 1 of the first cycle west exhaust, only 30 minutes of particulate was collected due to test equipment startup problems. The moisture and flow rates were still applied to the VOC results but the small amount of particulate was included with the next run.

The VOCs during Run 13 of Cycle 2 were not used; there was a problem with the dilution system and no VOCs were recorded, so an average of tests 12 and 14 were used during this period.

On the Sample Recovery Data Sheet for Run 10 of Cycle 2, the weight of the first impinger was incorrectly recorded as 894g, the lab received about 984g.

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 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 0.001 inch of water. The micro

manometer reads to 0.0000 inches of water.

Moisture was determined (through impinger weight gain) for each run (four-hour period) to allow moisture correction of the TGOC results. Blank Correction Calculations are shown 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 four-hour 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 test run (four-hour period). 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.

VOC A continuous analyzer was used for VOC determination as total gaseous organic compounds according to EPA Method 25A. A JUM Engineering Model VE-7 heated flame ionization detector was used on the 0-1000 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 four-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 after the first day of testing. 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 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. Except for one four-hour period, calibrations showed good stability. 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 manometers' 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 factors generated in this work are similar to the hemlock emission factors published in NCASI Technical Bulletin 718.

Figure 1

Forest Research Lab with Kiln Exhausts (Looking East)

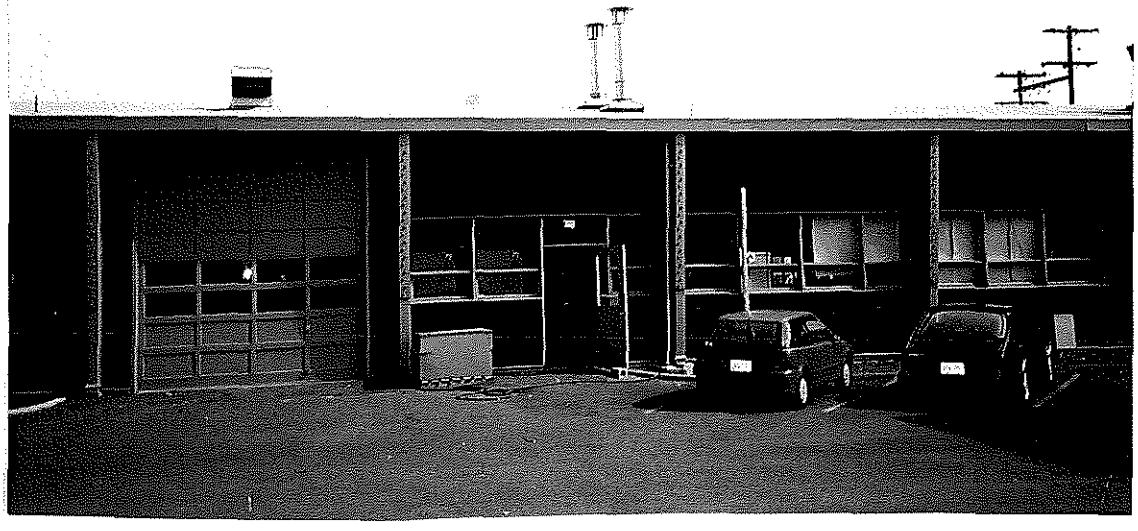


Figure 2

Kiln Exhausts During Sampling

(TGOC analyzer is in trailer)

Figure 3

16 Ft. Wellons Kiln (Loading End)

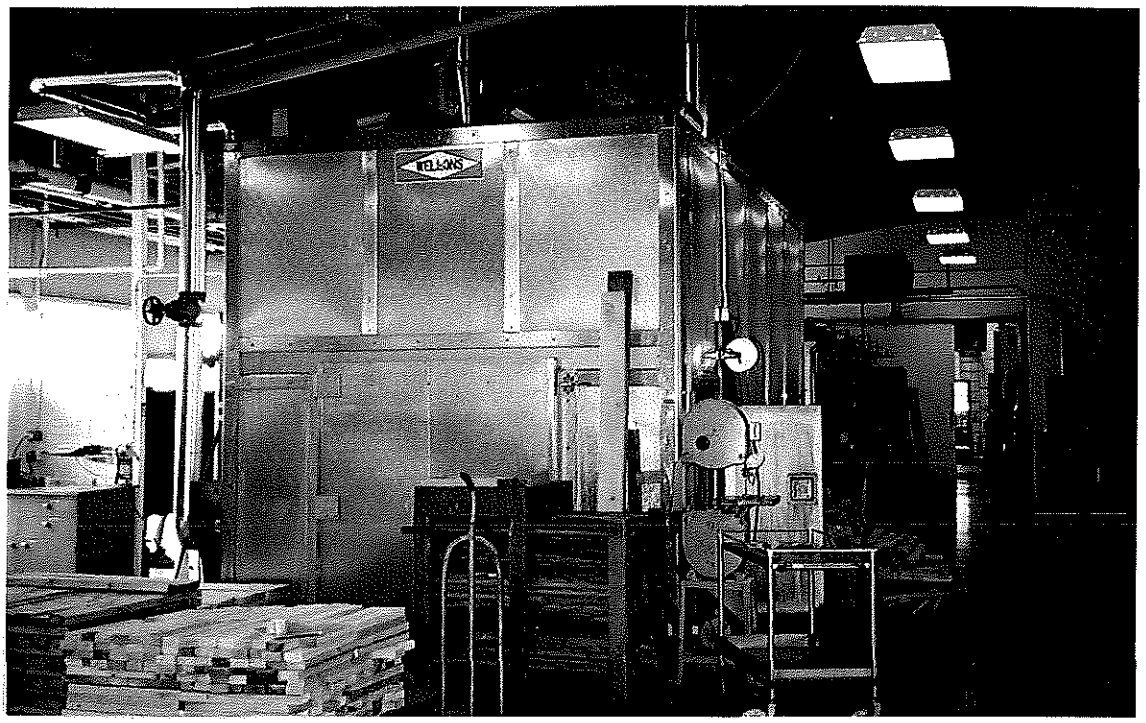


Figure 4

16 ft. Wellons Kiln (Opposite End)

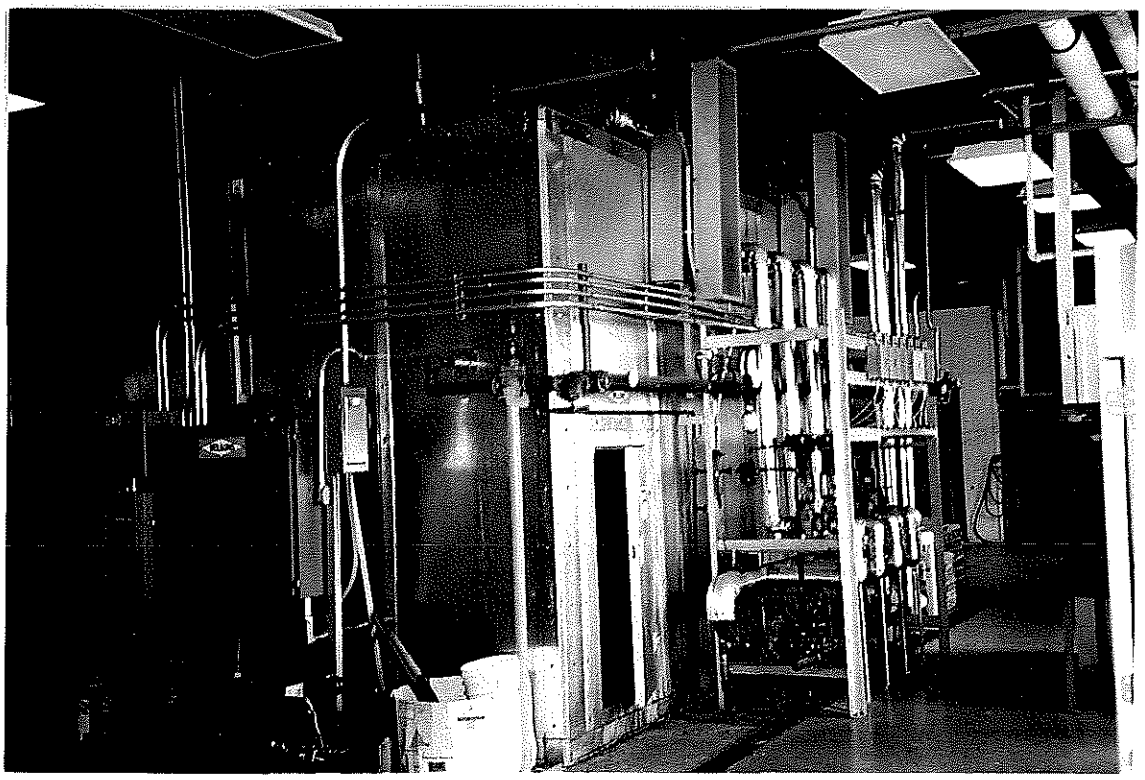


Figure 5
Kiln Exhaust Ducts (West Side)

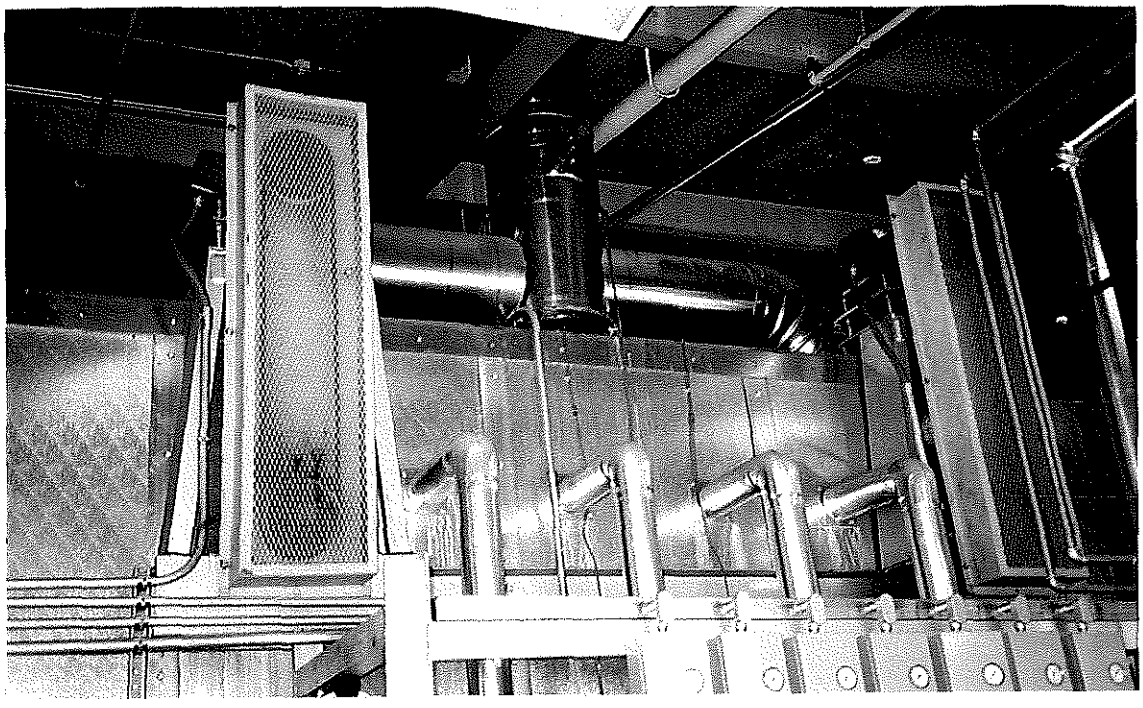


Figure 6

East Side of Kiln Interior (no lumber)

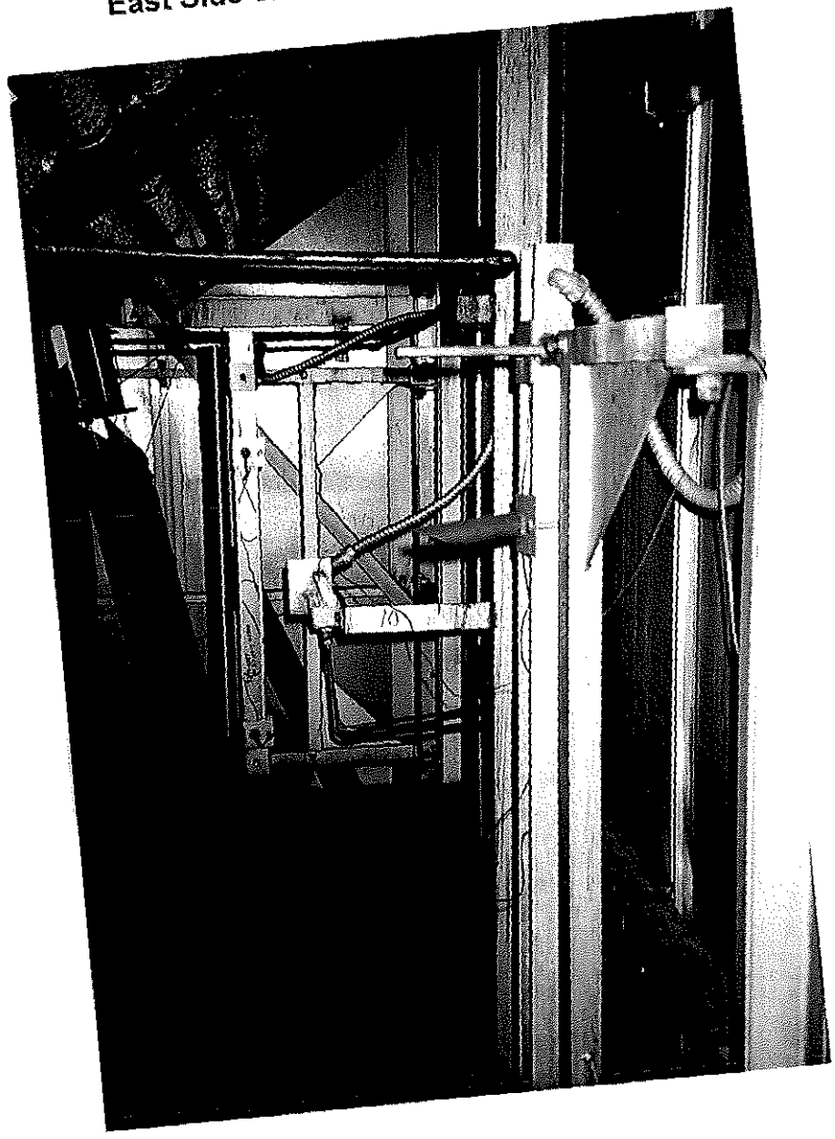


Figure 7
Rooftop Sampling

Figure 8
Exhausts During Testing (Skin Removed)

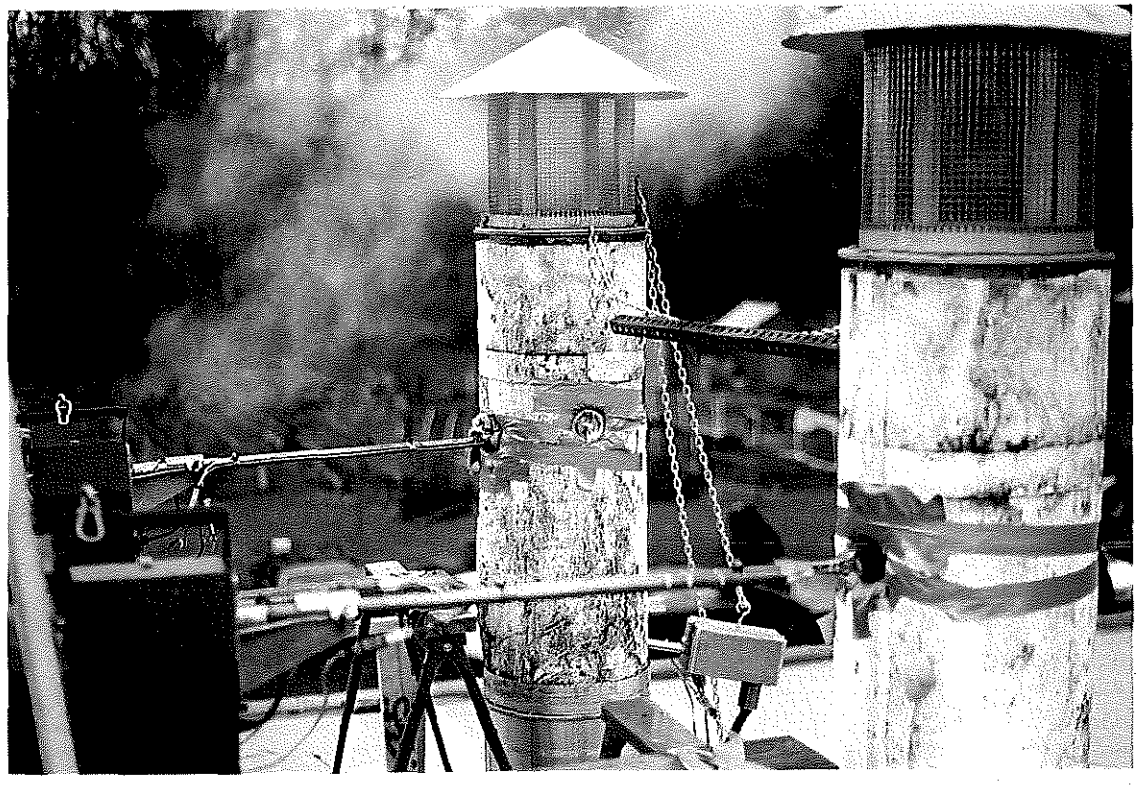


Figure 9

Close-up of Exhaust Outlet (after nine years)

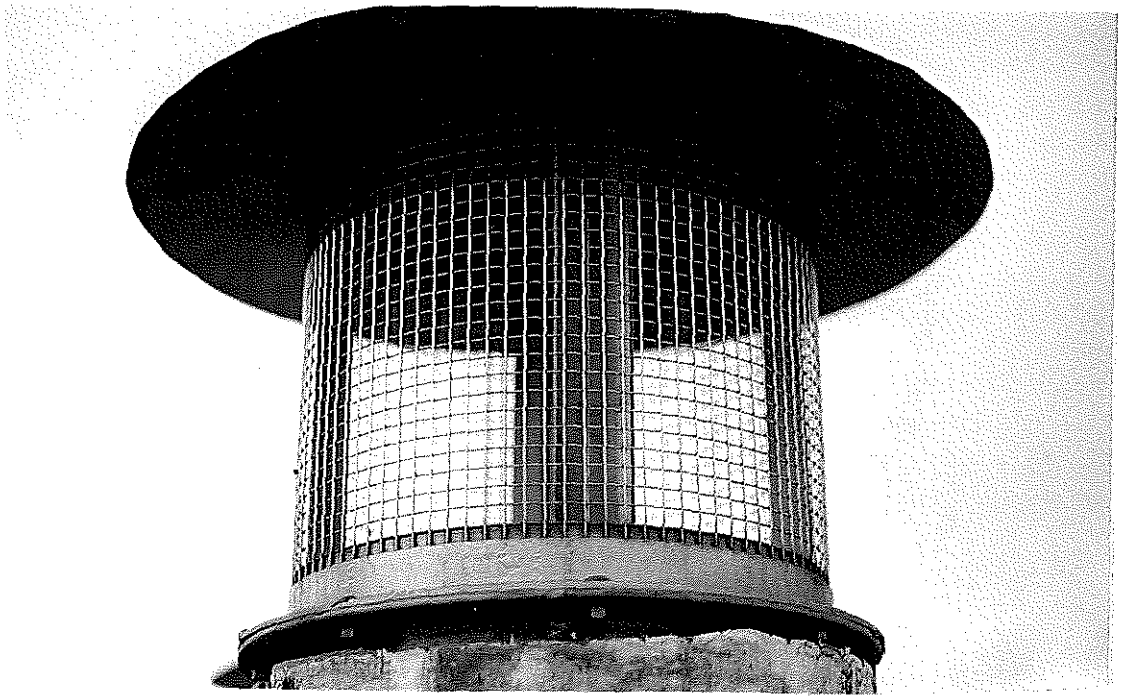


Figure 10

Particulate Control Boxes During Sampling

APPENDIX

Nomenclature & Drift Correction Documentation

Total Particulate

- Particulate Emissions Summary
- Particulate Emissions Determination
- Sample Calculations
- Field Data Sheets
- Blank Correction Sheet
- Laboratory Results and Worksheet
- Moisture Catch
- Moisture Catch Field Data Sheets
- Sample Recovery Calculations
- Traverse Point Locations

Gases

- TGOC Emissions Summary
- Gaseous Determinations (Bias Checks)
- Data Logger Gas Chart
- Strip Chart
- Calibration Gas Certificates
- Flow Rate Determination

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 ft³	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 ft³		[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.

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

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 - Cycle No.1 Summary

Willamette Ind. - OSU
Cycle No. 1 Hemlock - Particulate
Nov 16-18, 1998

Run ID	Start	End	Test min	Interval Time min	Bws Kiln	Qsd dscfm	Isokinetics %	Particulate gr/dscf	Particulate lbm/hr	Particulate lbm	Percent Back Half
	13:44	14:20		36							
1	14:20	14:50		30	*5.00*	147.2					
	14:50	15:59		69							
2	15:59	19:48	222.5	229	38.96	27.5	157.5	0.00610	0.00140	0.00519	95.9%
	19:48	20:06		18					0.00140	0.00042	
3	20:06	23:36	160.0	210	49.40	35.1	106.6	0.00460	0.00140	0.00373	90.2%
	23:36	23:48		12					0.00313	0.00063	
4	23:48	03:44	235.0	236	37.32	50.6	115.8	0.00990	0.00430	0.01684	97.8%
	03:44	03:59		15					0.00318	0.00080	
5	03:59	07:25	205.0	206	28.29	90.9	96.4	0.00240	0.00190	0.00649	87.1%
	07:25	08:12		47					0.00205	0.00161	
6	08:12	11:44	203.8	212	28.62	71.6	111.5	0.00350	0.00220	0.00747	92.8%
	11:44	12:22		38					0.00206	0.00130	
7	12:22	15:49	187.4	207	24.21	77.6	103.9	0.00290	0.00190	0.00593	89.6%
	15:49	16:07		18					0.00159	0.00048	
8	16:07	19:44	206.8	217	24.09	44.4	130.3	0.00350	0.00130	0.00448	93.5%
	19:44	20:05		21					0.00159	0.00056	
9	20:05	23:27	195.0	202	23.72	67.1	104.4	0.00320	0.00190	0.00618	90.7%
	23:27	23:48		21					0.00206	0.00072	
10	23:48	03:29	220.0	221	23.06	60.5	122.8	0.00430	0.00220	0.00807	95.1%
	03:29	03:52		23					0.00187	0.00072	
11	03:52	07:35	210.0	223	26.64	60.2	106.8	0.00290	0.00153	0.00535	89.3%
	07:35	07:58		23					0.00141	0.00054	
12	07:58	11:50	224.0	232	27.95	34.5	151.3	0.00430	0.00130	0.00485	94.7%
	11:50	12:03		13					0.00169	0.00037	
13	12:03	16:06	210.0	243	43.10	56.3	110.9	0.00440	0.00210	0.00735	90.9%

			Time Weighted Averages					
			H2O %	Qsd dscfm	Iso %	gr/dscf	lbm/hr	Total lbm
Total Cycle Time	3,022	min						0.09428
Total Test Interval	2,887	min					0.00170	0.09007
Total Actual Testing Time	2,480	min	31.1	56.1	119.0	0.00442		0.08194
Percent Actual Testing of Cycle Time	82.0%							

Production 2,048 bft
0.04001 lbm/Mdbft (For actual testing time)
0.04604 lbm/Mdbft (Corrected for untested intervals between runs, port changes and 13:44 to 15:59)

NOTES
[A] Emissions for untested intervals are time weighted average of previous and following tests.
[B] Run one incomplete due to equipment problems (13:44 to 15:59)
[C] Total cycle time is from 13:44 Nov 16 to 16:06 Nov 18.
[D] Total test interval time is from 15:59 Nov 16 to 16:06 Nov 18.
[E] Total actual testing time is the time the meter box is sampling.

Particulate - Cycle No.2 Summary

Oregon State - Willamette
Cycle No. 2 Hemlock - Particulate
Nov 18-21, 1998

Run ID	Start	End	Test min	Interval Time min	Bws Kiln	Qsd dscfm	Isokinetics %	Particulate gr/dscf	Particulate lbm/hr	Particulate lbm	Percent Back Half
	20:05	20:40		35							
1	20:40	22:15	80.0	95	6.97	212.1	102.1	0.00290	0.00520	0.00823	90.8%
	22:15	22:35		20					0.00322	0.00107	
2	22:35	02:13	210.0	218	40.56	52.5	126.8	0.00546	0.00246	0.00894	93.7%
	02:13	02:31		18					0.00217	0.00065	
3	02:31	06:15	210.0	224	48.50	56.4	115.0	0.00390	0.00189	0.00704	87.8%
	06:15	06:33		18					0.00231	0.00069	
4	06:33	10:31	225.0	238	37.08	66.4	123.5	0.00477	0.00271	0.01076	93.2%
	10:31	10:48		17					0.00279	0.00079	
5	10:48	14:32	210.0	224	28.73	116.9	95.7	0.00286	0.00287	0.01070	88.0%
	14:32	14:51		19					0.00235	0.00074	
6	14:51	18:31	213.8	220	24.76	79.0	111.4	0.00273	0.00185	0.00677	90.1%
	18:31	19:03		32					0.00205	0.00109	
7	19:03	22:19	190.0	196	23.97	92.2	110.5	0.00288	0.00227	0.00742	88.8%
	22:19	22:39		20					0.00180	0.00060	
8	22:39	02:14	215.0	215	22.56	69.1	110.0	0.00233	0.00138	0.00494	88.7%
	02:14	02:40		26					0.00148	0.00064	
9	02:40	06:18	210.0	218	22.39	68.2	110.9	0.00270	0.00158	0.00573	88.3%
	06:18	06:37		19					0.00157	0.00050	
10	06:37	10:33	230.0	236	22.90	62.9	110.7	0.00291	0.00157	0.00618	90.9%
	10:33	10:45		12					0.00166	0.00033	
11	10:45	14:34	225.0	229	25.35	86.5	115.3	0.00237	0.00176	0.00671	86.2%
	14:34	14:45		11					0.00146	0.00027	
12	14:45	18:34	220.0	229	25.29	54.0	122.2	0.00248	0.00115	0.00438	89.0%
	18:34	18:49		15					0.00175	0.00044	
13	18:49	22:33	160.0	224	42.40	65.4	132.4	0.00459	0.00257	0.00960	90.8%
	22:33	22:54		21					0.00249	0.00087	
14	22:54	00:29	95.0	95	43.16	49.9	130.4	0.00551	0.00236	0.00373	93.5%
	00:29	01:12		43							

			Time Weighted Averages H2O %	Qsd dscfm	Iso %	gr/dscf	lbm/hr	Total lbm
Total Cycle Time	3,187	min						0.11258
Total Test Interval	3,109	min					0.00181	0.10982
Total Actual Testing Time	2,694	min	29.9	75.7	115.2	0.00337		0.10113
Percent Actual Testing of Cycle Time	84.5%							

Production 2,048 bft
0.04938 lbm/Mdbft (For actual testing time)
0.05497 lbm/Mdbft (Corrected for untested intervals between runs, port changes,12:05 to 12:40, and 00:29 to 01:12)

NOTES
[A] Emissions for untested intervals are time weighted average of previous and following tests.
[B]
[C] Total cycle time is from 20:05 Nov 18 to 01:12 Nov 21.
[D] Total test interval time is from 20:40 Nov 18 to 00:29 Nov 21.
[E] Total actual testing time is the time the meter box is sampling.

Particulate Emissions

Client	Willamette Ind. - OSU						16-Nov-98	Date	
Source	Wood Kiln - Hemlock						drb/cdb	Operator	
Location	Corvallis, OR						cyclrune	File	
Methods	EPA 1-4, ODEQ 5						mew	Analysist/QA	
Definitions	Symbol	Units	Cycle No. 1 - EAST						Average
			Run 2	Run 4	Run 6	Run 8	Run 10	Run 12	Time Weighted
Date			16-Nov	16-Nov	17-Nov	17-Nov	17-Nov	18-Nov	
Time, Starting			15:59	23:48	08:12	16:07	23:48	07:58	
Time, Ending			19:48	03:44	11:44	19:44	03:29	11:50	
Volume, Gas sample	Vm	dcf	45.854	66.222	79.175	57.525	79.022	56.854	
Temperature, Dry gas meter	Tm	°F	61.0	65.7	73.4	66.4	69.8	72.5	68.1
Temperature, Stack gas	Ts	°F	165.6	168.4	158.6	155.6	155.0	159.3	160.6
Pressure differential across orifice	dH	in H2O	0.049	0.184	0.510	0.138	0.289	0.101	0.208
Average sqrt vel. pressure (flow)	dp^½	in H2O^½	0.0126	0.0228	0.0286	0.0168	0.0226	0.0137	0.019
Average sqrt vel. pressure (iso)	dp^½	in H2O^½	0.0126	0.0228	0.0286	0.0168	0.0226	0.0137	
Diameter, Nozzle	Dn	in	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	
Pitot tube coefficient	Cp		0.8054	0.8054	0.8054	0.8054	0.8054	0.8054	
Dry gas meter calibration factor	Y		0.9909	0.9909	0.9909	0.9909	0.9909	0.9909	
Pressure, Barometric	Pbar	in Hg	30.05	30.05	30.09	30.09	30.09	30.08	
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	
Time, Total sample	Ø	min	222.5	235.0	203.8	206.8	220.0	224.0	
Stack Area	As	in²	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	
Volume of condensed water	Vlc	ml	627.1	837.5	666.2	387.7	499.9	462.8	
Particulate sample weight-Total	mn	mg	18.15	42.51	17.82	13.12	21.65	15.55	
Oxygen	Atmos.	% O2	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	
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	
Pressure, Absolute Stack	Ps	in Hg	30.05	30.05	30.09	30.09	30.09	30.08	
Pressure, avg arcoss orifice	Po	in Hg	30.05	30.06	30.13	30.10	30.11	30.09	
Volume, Dry standard gas sample	Vm(std)	dscf	46.25	66.22	78.19	57.52	78.52	56.17	63.67
Volume, Water Vapor	Vw(std)	scf	29.52	39.42	31.36	18.25	23.53	21.79	27.48
Moisture, % Stack (EPA 4)	Bws(1)	%	38.96	37.32	28.62	24.09	23.06	27.95	30.17
Moisture, % Stack (Psycho-Sat)	Bws(2)	%	36.40	38.71	30.95	28.88	28.43	31.45	32.60
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	na	37.50	25.00	25.00	20.00	20.00	
Mole Fraction dry Gas	mfg		61.0%	62.7%	71.4%	75.9%	76.9%	72.1%	69.8%
Molecular weight, Wet Stack	Ms	lbm / lbmole	24.70	24.88	25.83	26.33	26.44	25.90	25.66
Velocity, Stack gas (flow)	vs	fpm	47.9	86.4	105.5	61.2	82.2	50.4	72.0
Velocity, Stack gas (iso)	vs	fpm	47.9	86.4	105.5	61.2	82.2	50.4	
Volumetric Flowrate, Actual	Qa	acf/min	53.1	95.7	116.8	67.8	91.0	55.8	79.8
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	27.5	50.6	71.6	44.4	60.5	34.5	47.9
Percent Isokinetic	I	%	157.5	115.8	111.5	130.3	122.8	151.3	131.7
Grain Loading, Actual	cg	gr / dscf	0.0061	0.0099	0.0035	0.0035	0.0043	0.0043	0.0053
		mg / dscm	13.9	22.7	8.0	8.1	9.7	9.8	12.2
Particulate Mass Emissions	Ct	lbm / hr	0.0014	0.0043	0.0022	0.0013	0.0022	0.0013	0.0021
		gm / hr	0.65	1.95	0.98	0.61	1.00	0.57	0.97
Total mass emissions		gm	2.40	7.64	3.32	2.09	3.67	2.14	
Front Half		gm	0.08	0.14	0.15	0.09	0.13	0.08	
Back Half		gm	2.32	7.49	3.17	2.00	3.54	2.06	

Particulate Emissions

Client	Willamette Ind. - OSU					16-Nov-98		Date
Source	Wood Kiln - Hemlock					drb/cdb		Operator
Location	Corvallis, OR					cyclrunw		File
Methods	EPA 1-4, ODEQ 5					mew		Analysist/QA
Definitions	Symbol	Units	Cycle No. 1 - WEST						Average
			Run 1&3	Run 5	Run 7	Run 9	Run 11	Run 13	Time Weighted
Date			16-Nov	17-Nov	17-Nov	17-Nov	18-Nov	18-Nov	
Time, Starting			*20:06	03:59	12:22	20:05	03:52	12:03	
Time, Ending			23:36	07:25	15:49	23:27	07:35	*16:06	
Volume, Gas sample	Vm	dcf	36.095	87.245	78.297	66.834	66.222	63.694	
Temperature, Dry gas meter	Tm	°F	67.1	72.6	79.4	76.0	76.9	78.1	75.2
Temperature, Stack gas	Ts	°F	176.9	161.5	154.1	152.7	155.4	172.4	161.8
Pressure differential across orifice	dH	in H2O	0.168	0.659	0.539	0.389	0.332	0.399	0.422
Average sqrt velocity pressure (flow)	dp^½	in H2O^½	0.020	0.037	0.030	0.026	0.024	0.028	0.028
Average sqrt velocity pressure (iso)	dp^½	in H2O^½	0.024	0.037	0.032	0.026	0.024	0.028	0.029
Diameter, Nozzle	Dn	in	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	
Pitot tube coefficient	Cp		0.7901	0.7901	0.7901	0.7901	0.7901	0.7901	
Dry gas meter calibration factor	Y		0.9906	0.9906	0.9906	0.9906	0.9906	0.9906	
Pressure, Barometric	Pbar	in Hg	30.05	30.09	30.09	30.09	30.08	30.44	
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	
Time, Total sample	Ø	min	160.0	205.0	187.4	195.0	210.0	210.0	
Stack Area	As	in²	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	
Volume of condensed water	Vlc	ml	746.3	723.3	518.9	433.8	500.9	1014.8	
Particulate sample weight-Total	mn	mg	10.71	13.59	14.21	13.69	12.14	18.04	
Oxygen	Atmos.	% O2	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	
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	
Pressure, Absolute Stack	Ps	in Hg	30.05	30.09	30.09	30.09	30.08	30.44	
Pressure, avg arcoss orifice	Po	in Hg	30.06	30.14	30.13	30.12	30.10	30.47	
Volume, Dry standard gas sample	Vm(std)	dscf	35.99	86.30	76.45	65.65	64.91	63.05	66.34
Volume, Water Vapor	Vw(std)	scf	35.13	34.05	24.43	20.42	23.58	47.77	30.96
Moisture, % Stack (EPA 4)	Bws(1)	%	49.40	28.29	24.21	23.72	26.64	43.10	32.13
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	46.39	33.13	27.84	26.92	28.74	41.66	33.81
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	45.00	35.00	na	20.00	20.00	30.00	
Mole Fraction dry Gas	mfg		50.6%	71.7%	75.8%	76.3%	73.4%	56.9%	67.9%
Molecular weight, Wet Stack	Ms	lbm / lbmole	23.56	25.87	26.31	26.37	26.05	24.24	25.45
Velocity, Stack gas (flow)	vs	fpm	75.3	133.9	106.9	91.7	86.0	105.3	100.7
Velocity, Stack gas (iso)	vs	fpm	94.1	133.9	112.6	91.7	86.0	105.3	
Volumetric Flowrate, Actual	Qa	acf/min	83.4	148.3	118.4	101.5	95.2	116.6	111.5
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	35.1	90.9	77.6	67.1	60.2	56.3	65.4
Percent Isokinetic	I	%	106.6	96.4	103.9	104.4	106.8	110.9	104.8
Grain Loading, Actual	cg	gr / dscf	0.0046	0.0024	0.0029	0.0032	0.0029	0.0044	0.0034
		mg / dscm	10.5	5.6	6.6	7.4	6.6	10.1	7.7
Particulate Mass Emissions	Ct	lbm / hr	0.0014	0.0019	0.0019	0.0019	0.0015	0.0021	0.0018
		gm / hr	0.63	0.86	0.87	0.84	0.68	0.97	0.81
Total mass emissions		gm	1.67	2.93	2.70	2.73	2.37	3.39	
Front Half		gm	0.17	0.39	0.29	0.26	0.26	0.31	
Back Half		gm	1.50	2.54	2.42	2.47	2.11	3.07	

Particulate Emissions

Client	Willamette Ind. - OSU					18-Nov-98			Date
Source	Wood Kiln - Hemlock					drb/cdb			Operator
Location	Corvallis, OR					cyc2runw			File
Methods	EPA 1-4, ODEQ 5					mew			Analysist/QA
Definitions	Symbol	Units	Cycle No. 2 - WEST						Average
			Run 1	Run 3	Run 5	Run 7	Run 9	Run 11	Run 13	Time Weighed
Date			18-Nov	19-Nov	19-Nov	20-Nov	20-Nov	20-Nov	20-Nov	
Time, Starting			20:40	02:31	10:48	19:03	02:40	10:45	18:49	
Time, Ending			22:15	06:15	14:32	22:19	06:18	14:34	22:33	
Volume, Gas sample	Vm	dcf	31.840	64.557	90.067	92.106	76.084	107.325	66.257	80.3
Temperature, Dry gas meter	Tm	°F	52.6	59.1	66.8	67.8	71.0	70.2	69.9	66.5
Temperature, Stack gas	Ts	°F	97.2	177.0	159.1	158.1	155.8	159.0	174.7	159.4
Pressure differential across orifice	dH	in H2O	0.558	0.330	0.775	0.625	0.320	0.606	0.413	0.5175
Average sqrt velocity pressure (flow)	dp^½	in H2O^½	0.066	0.031	0.047	0.035	0.026	0.034	0.032	0.0363
Average sqrt velocity pressure (iso)	dp^½	in H2O^½	0.066	0.031	0.047	0.035	0.026	0.034	0.032	
Diameter, Nozzle	Dn	in	*0.6192*	0.9880	*0.8878*	0.9880	0.9880	0.9880	0.9880	
Pitot tube coefficient	Cp		0.7900	0.7900	0.7900	0.7900	0.7900	0.7900	0.7900	
Dry gas meter calibration factor	Y		0.9906	0.9906	0.9906	0.9909	0.9909	0.9909	0.9909	
Pressure, Barometric	Pbar	in Hg	30.08	30.08	30.44	30.44	30.44	30.44	30.44	
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Time, Total sample	Ø	min	80	210	210	190	210	225	160	
Stack Area	As	in²	159.5	159.5	159.5	159.5	159.5	159.5	159.5	
Nozzle Area	An	in²	0.3011	0.7667	0.6190	0.7667	0.7667	0.7667	0.7667	
Volume of condensed water	Vlc	ml	52.1	1309.4	780.4	623.1	467.8	778.4	1041.9	
Particulate sample weight-Total	mn	mg	6.07	16.67	17.02	17.46	13.45	16.72	19.91	
Oxygen	Atmos.	% O2	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	
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	28.96	
Pressure, Absolute Stack	Ps	in Hg	30.08	30.08	30.44	30.44	30.44	30.44	30.44	
Pressure, avg arcoss orifice	Po	in Hg	30.12	30.10	30.50	30.49	30.46	30.48	30.47	
Volume, Dry standard gas sample	Vm(std)	dscf	32.71	65.44	91.14	93.01	76.33	107.89	66.62	81.0
Volume, Water Vapor	Vw(std)	scf	2.45	61.63	36.73	29.33	22.02	36.64	49.04	36.7
Moisture, % Stack (EPA 4)	Bws(1)	%	6.97	48.50	28.73	23.97	22.39	25.35	42.40	30.0
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	5.84	46.46	30.93	30.24	28.69	30.88	43.72	33.0
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	15.00	40.00	30.00	25.00	20.00	20.00	35.00	27.2
Mole Fraction dry Gas	mfg		93.0%	51.5%	71.3%	76.0%	77.6%	74.7%	57.6%	70.0%
Molecular weight, Wet Stack	Ms	lbm / lbmole	28.20	23.65	25.82	26.34	26.51	26.19	24.32	25.7
Velocity, Stack gas (flow)	vs	fpm	216.1	118.6	170.7	126.0	90.9	120.6	121.2	130.4
Velocity, Stack gas (iso)	vs	fpm	216.1	118.6	170.7	126.0	90.9	120.6	121.2	130.4
Volumetric Flowrate, Actual	Qa	acf/min	239.3	131.4	189.0	139.5	100.7	133.6	134.2	144.5
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	212.1	56.4	116.9	92.2	68.2	86.5	65.4	89.6
Percent Isokinetic	I	%	102.1	115.0	95.7	110.5	110.9	115.3	132.4	111.9
Grain Loading, Actual	cg	gr / dscf	0.0029	0.0039	0.0029	0.0029	0.0027	0.0024	0.0046	0.0032
		mg / dscm	6.6	9.0	6.6	6.6	6.2	5.5	10.6	7.2
Particulate Mass Emissions	Ct	lbm / hr	0.0052	0.0019	0.0029	0.0023	0.0016	0.0018	0.0026	0.0023
		gm / hr	2.36	0.86	1.31	1.04	0.72	0.80	1.17	1.06
Total mass emissions		gm	3.15	3.02	4.58	3.29	2.52	3.02	3.13	
Front Half		gm	0.31	0.39	0.58	0.39	0.31	0.44	0.31	
Back Half		gm	2.84	2.63	4.00	2.90	2.21	2.58	2.82	

Particulate Emissions

Client	Willamette Ind. - OSU					18-Nov-98			Date
Source	Wood Kiln - Hemlock					drb/cdb			Operator
Location	Corvallis, OR					cyc2rune			File
Methods	EPA 1-4, ODEQ 5					mew			Analysist/QA
Definitions	Symbol	Units	Cycle No. 2 - EAST						Average
			Run 2	Run 4	Run 6	Run 8	Run 10	Run 12	Run 14	Time Weighted
Date			18-Nov	19-Nov	19-Nov	20-Nov	20-Nov	20-Nov	20-Nov	
Time, Starting			22:35	06:33	14:51	10:39	06:37	14:55	22:54	
Time, Ending			02:13	10:31	18:31	02:14	10:33	18:34	00:29	
Volume, Gas sample	Vm	dcf	66.257	88.457	89.594	78.208	76.177	69.427	29.655	74.8
Temperature, Dry gas meter	Tm	°F	58.7	65.3	68.1	70.5	66.9	69.7	71.9	66.9
Temperature, Stack gas	Ts	°F	168.2	169.4	150.1	153.3	154.1	153.0	173.1	159.0
Pressure differential across orifice	dH	in H2O	0.2433	0.3813	0.4821	0.3179	0.2920	0.2252	0.2105	0.3159
Average sqrt velocity pressure (flow)	dp^½	in H2O^½	0.0248	0.0298	0.0298	0.0255	0.0234	0.0206	0.0244	0.0256
Average sqrt velocity pressure (iso)	dp^½	in H2O^½	0.0248	0.0298	0.0298	0.0255	0.0234	0.0206	0.0244	
Diameter, Nozzle	Dn	in	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	
Pitot tube coefficient	Cp		0.8054	0.8054	0.8054	0.8054	0.8054	0.8054	0.8054	
Dry gas meter calibration factor	Y		0.9909	0.9909	0.9909	0.9909	0.9909	0.9909	0.9909	
Pressure, Barometric	Pbar	in Hg	30.08	30.08	30.44	30.44	30.44	30.44	30.44	
Pressure, Static Stack	Pg	in H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Time, Total sample	Ø	min	210.0	225.0	213.8	215.0	230.0	220.0	95.0	
Stack Area	As	in²	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	
Volume of condensed water	Vlc	ml	974.8	1110.0	632.1	485.9	485.9	501.9	478.9	
Particulate sample weight-Total	mn	mg	23.80	27.41	15.98	11.86	14.53	11.21	10.61	
Oxygen	Atmos.	% O2	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	
Molecular weight, Dry Stack	Md	lbm / lbmole	28.96	28.96	28.96	28.96	28.96	28.96	28.96	
Pressure, Absolute Stack	Ps	in Hg	30.08	30.08	30.44	30.44	30.44	30.44	30.44	
Pressure, avg arcoss orifice	Po	in Hg	30.10	30.11	30.48	30.46	30.46	30.46	30.46	
Volume, Dry standard gas sample	Vm(std)	dscf	67.23	88.65	90.40	78.53	77.01	69.80	29.69	75.4
Volume, Water Vapor	Vw(std)	scf	45.88	52.25	29.75	22.87	22.87	23.62	22.54	32.1
Moisture, % Stack (EPA 4)	Bws(1)	%	40.56	37.08	24.76	22.56	22.90	25.29	43.16	29.8
Moisture, % Stack (Psychometry-Sat)	Bws(2)	%	38.48	39.48	24.99	27.00	27.55	26.80	42.24	31.5
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	na	na	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	20.00	30.00	25.00	20.00	20.00	20.00	35.00	23.4
Mole Fraction dry Gas	mfg		59.4%	62.9%	75.2%	77.4%	77.1%	74.7%	56.8%	70.2%
Molecular weight, Wet Stack	Ms	lbm / lbmole	24.52	24.90	26.25	26.49	26.46	26.20	24.24	25.7
Velocity, Stack gas (flow)	vs	fpm	94.4	112.9	107.6	92.0	84.2	74.5	93.3	94.2
Velocity, Stack gas (iso)	vs	fpm	94.4	112.9	107.6	92.0	84.2	74.5	93.3	94.2
Volumetric Flowrate, Actual	Qa	acf/min	104.6	125.1	119.2	101.8	93.3	82.5	103.4	104.3
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	52.5	66.4	79.0	69.1	62.9	54.0	49.9	63.0
Percent Isokinetic	I	%	126.8	123.5	111.4	110.0	110.7	122.2	130.4	118.3
Grain Loading, Actual	cg	gr / dscf	0.0055	0.0048	0.0027	0.0023	0.0029	0.0025	0.0055	0.0036
		mg / dscm	12.5	10.9	6.2	5.3	6.7	5.7	12.6	8.2
Particulate Mass Emissions	Ct	lbm / hr	0.0025	0.0027	0.0018	0.0014	0.0016	0.0011	0.0024	0.0019
		gm / hr	1.12	1.23	0.84	0.63	0.71	0.52	1.07	0.86
Total mass emissions		gm	3.91	4.62	2.99	2.24	2.73	1.91	1.69	
Front Half		gm	0.24	0.31	0.30	0.25	0.25	0.21	0.11	
Back Half		gm	3.66	4.30	2.69	1.99	2.48	1.70	1.58	

Client/Source/Location WI/OSU Kiln/Cycle 1 Run 4 Run # 4 cyc 1

Date 11-16-98 Hemlock

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 in²/ °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	66.222		Pg	in H2O	0
Tm	°F	65.69 °R	+459.67	Ø	min	235
Ts	°F	168.43 °R	+459.67	As	in²	159.4
dH	in H2O	0.184		An	in²	0.766
dp^½	in H2O^½	0023		Vlc	ml	837.5
Dn	in	0.988		mn	mg	42.51
Cp		.805		O2	% O2	20.95
Y		.99086		CO2	% CO2	0.03
Pbar	in Hg	30.05				

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

$$Md = [1-(20.95/100)-(0.03/100)](28.154) + [(20.95/100)31.999] + [(0.03/100)44.010] = 28.964$$

22.247 6.704

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

$$P_s = 30.05 + 0 = 30.05$$

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

$$P_o = 30.05 + \frac{0.184}{13.5955} = 30.064$$

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

$$V_{m(std)} = (0.99086)(66.222)(527.67)(30.064)/(29.92129)(525.36) = 66.220$$

Volume, Water Vapor Vw(std) scf 0.04707 Vlc

$$V_{w(std)} = 0.04707(837.5) = 39.421$$

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

$$Bws(1) = 100\{39.421/[39.421+66.220]\} = 37.316$$

Mole fraction gas mfg 1-(Bws/100)

$$mfg = 1-(37.316/100) = 0.627$$

Client/Source/Location W.I./OSO Kiln/Cycle 1 Run # 4 cyc 1

Date 11-16-98 Hemlock

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

$$Ms = [[28.964)(0.627) + (18.015(1-0.627))] = 24.880$$

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

$$vs = (5129.4)(0.805)(0.023)[(628.1)/(30.05)(24.880)]^{1/2} = 87.048$$

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

$$Q_a = (159.4)(87.048)/144 = 96.357$$

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

$$Q_{sd} = (96.357)(527.67)(0.627)(30.05)/(29.92129)(628.1) = 50.974$$

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

$$I = (816.5455)(628.1)(66.22)/(87.048)(30.05)(0.627)(0.766)(235) = 115\%$$

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

$$cg = [15.432(42.51)/(66.22)(1000)] = 0.0099$$

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

$$Ct = (60)(0.0099)(50.974)/7000 = 0.0043$$

1WA

Field Data Sheet

Horizon Engineering

Client/Plant/Location: OSU West

Date 11/16

Test Method 0061 7

Concurrent Testing VOC

Run # 1

Operator CDB Support DRB

Temperature, Am (Ta) 65

Pressure, Bar (Pb) 1015 = 30.05

Pressure, Static (Pstat) ~~30.05~~ 0

Filters 98m-169 96s-178

ADD TO RUN #3W

Stack Diagram

Cyclonic Flow ?

Probe 3-1 Cp .79 Heat Set 250 °F

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle A02

Sample Box 3 Heat Set 250 °F

Meter Box 8 dH@ 1.82334 Y .99062

Meter Pretest 0 cfm 15 inHg

Leak Check Post 0 cfm 6 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 (Tl)	AUX °F (Tx)	Pump Vacuum inHg (Pv)
		1420	251.351	X		X	Amb: X	Amb: X	Amb: X	Amb:	Amb:	Amb:		
1 1	5		252.000	.0014	.063	.06	85	58	57	254	164	51		4
2 1	10		252.76	.0016	.072	.07	86	58	57	254	190	51		4
3 2	15		253.58	0.0017	.0764	.08	90	59	57	258	200	51		4
4 2	20		254.99	0.0017	.08	.08	93	60	58	254	146	51		4
5 3	25		254.80	0.0007	.0315	.03	96	60	58	258	—	50		4
6 3	30		↓	0.0006	.0270	.03	98	61	58	242		50		4
7			Final Volume											
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes: Stopped at 25 min to repair filter heat

Field Data Sheet

Orizon Engineering

Date 11/16/98
Test Method OOEQ 7
Concurrent Testing VOC
Run # 2
Operator CDB Support DRB
Temperature, Am (Ta) 55
Pressure, Bar (Pb) 30.05
Pressure, Static (Pstat) 0
Filters 98m-209 965-

Client/Plant/Location : OSU East

Probe 3-2 Cp .80557 Heat Set 250
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle 5 B01 .9880
Sample Box Heat Set 250 °F
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest 0 cfm 1.5 inHg
Leak Check Post cfm inHg
Moisture 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	255.302											
1 1	5		256.32	.0002	.0581	.06	127	59	58	263	278	52		4
2 1	10		257.29	.0002	.0581	.06	131	59	58	264	281	49		4
3 2	15		258.60	.0003	.0871	.09	134	58	58	263	282	47		4
4 2	20		259.52	0.0001	.0290	.03	138	60	58	263	281	47		4
5 3	25		260.250	0.0001	.0290	.03	140	60	58	265	281	51		4
6 3	30		260.99	0.0001	.0290	.03	142	60	58	266	282	52		4
7 4	35		261.72	0.0001	.0290	.03	144	61	58	264	281	52		4
8 4	40		—.—	0.0004	.1117	.11	147	61	59	263	284	47		4
9 5	45		264.58	.0003	.0838	.08	150	63	60	264	284	47		4
10 5	50		265.56	0.0003	.0838	.08	152	62	60	265	287	49		4
11 6	55		266.99	0.0005	.1396	.14	154	63	60	263	286	47		4
12 6	60		—.—	0.0005	.1396	.14	156	63	60	263	285	47		4
13 1	5		269.27	0.0002	.0558	.06	157	63	61	265	279	54		4
14 1	10		270.13	0.0001	.0290	.03	156	63	61	265	280	51		4
15 2	15		271.18	0.0002	.0558	.06	161	63	61	265	282	55		4
16 2	20		272.25	0.0001	.0290	.03	161	63	61	265	281	52		4
17 3	25		273.33	0.0001	.0290	.03	165	63	61	264	278	51		4
18 3	30		274.42	0.0001	.0290	.03	167	63	61	263	278	49		4
19 4	35		275.51	0.0001	.0290	.03	171	63	61	264	284	53		4
20 4	40		276.55	0.0001	.0290	.03	177	63	61	263	279	53		4
21 5	45		277.69	0.0002	.0558	.06	180	63	61	265	282	54		4
22 5	50		278.67	0.0001	.0290	.03	180	63	61	266	285	55		4
23 6	55		279.75	0.001	.0290	.03	180	63	61	265	290	55		4
24 6	60		280.83	0.0001	.0290	.03	180	63	61	265	285	56		4
25														

Notes: Damper switch @ 15:45

Field Data Sheet

Orizon Engineering

Date 11/16/18
Test Method OPPOT
Concurrent Testing VOC
Run # 2
Operator CDB Support DRB
Temperature, Am (Ta) 55
Pressure, Bar (Pb) 30.05
Pressure, Static (Pstat) 0

Stack Diagram

Filters Cyclonic Flow ?

Client/Plant/Location : OSV East

Probe S-2 Cp .8053 Heat Set 250 °F
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle S BC1 .9880
Sample Box Heat Set 250 °F
Meter Box 6 dH@ 1.6902 Y .9908
Meter Pretest 0 cfm 15 inHg
Leak Check Post 0 cfm 6 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)
			280.83				Amb:		Amb:	Amb:	Amb:	Amb:		
1 1	5		281.91	0.001	.0290	.03	180	63	61	264	281	60		4
2 1	10		282.99	0.001	.0290	.03	180	63	61	264	281	63		4
3 2	15		284.07	0.001	.0290	.03	180	63	61	264	282	64		5
4 2	20		285.15	0.001	.0290	.03	181	63	61	264	282	68		5
5 3	25		286.39	0.0002	.0538	.05	181	63	61	264	284	68		5
6 3	30		287.50	0.002	.0538	.05	181	63	61	264	284	67		5
7 4	35		288.62	0.0002	.0538	.05	181	63	61	265	282	67		5
8 4	40		289.72	0.0001	.0298	.03	181	62	60	265	280	55		5
9 5	45		290.83	0.0001	.0298	.03	181	63	61	264	281	51		5
10 5	50		291.92	0.0001	.0298	.03	181	63	60	265	282	50		5
11 6	55		293.02	0.0002	.0538	.05	181	62	60	264	281	48		5
12 6	60	1900	294.122	0.0001	.0298	.03	181	61	60	264	282	47		5
13 1	5	1905	295.98	0.0001	.0298	.03	180	61	60	260	280	49		5
14 1	10	10	295.77	0.0001	.0298	.03	163	61	60	263	279	46		5
15 2	15	15	296.82	0.0003	.0807	.08	160	61	60	263	279	44		5
16 2	20	20	297.42	0.0001	.0298	.03	163	61	60	263	281	44		5
17 3	25	25	298.00	0.0001	.0298	.03	167	61	60	263	280	46		5
18 3	30	30	298.56	0.0001	.0298	.03	161	61	60	263	283	46		5
19 4	35	35	299.55	0.003	.0807	0.08	180	61	60	263	281	46		5
20 4	40	40	300.83	0.0004	.1076	.11	180	61	59	263	284	44		5
21 5	42½	42½	301.156	0.0001	.0298	.03	181	61	60	263	277	44		4
22 5	19:48		changed dampers											
23 6														
24 6														
25														

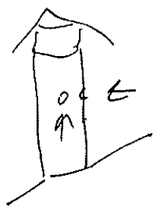
Notes:

1WB

Field Data Sheet

orizon Engineering

Date 11/16/98
Test Method OMEQ 7
Concurrent Testing VOC
Run # 3
Operator CDB Support DAB
Temperature, Am (Ta) 55
Pressure, Bar (Pb) 30.05
Pressure, Static (Pstat) 0



Stack Diagram

Client/Plant/Location : OSU West
Probe S-1 Cp .79 Heat Set 250 °F
Pitot Pretest 0.0 in 4 in/min
Leak Check Post in in/min
Nozzle #801 Da .6175 .9880
Sample Box Heat Set 250 °F
Meter Box 2 dH@ 1.82834 Y 0.99062
Meter Pretest 0 cfm 15 inHg
Leak Check Post cfm 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 (Ti) Amb:	AUX °F (Tx)	Pump Vacuum inHg (Pv)
South Port		2006	635.328											
1 1	5		635.895	0.0005	.1564	.16	178	51	50	277	236	44		1
2 1	10		637.625	0.0004	.1091	.11	179	56	50	239	278	43		1
3 2	15		638.792	0.0004	.094	.10	179	55	51	244	266	41		1
4 2	20		639.521	.0004	.096	.1	178	64	51	242	266	42		1
5 3	25		640.4	.0004	"	.1	178	64	51	240	260	42		1
6 3	30		641.	.0004		.1	177	66	50	241	265	43		1
7 4	35		642.0	.0004		.1	177	68	51	240	260	44		1
8 4	40		642.875	.0004		.1	178	71	52	241	267	44		1
9 5	45		643.801	.0004		.1	177	73	54	244	268	44		1
10 5	50		644.720	.0004	.096	.1	177	73	54	244	268	44		1
11 6	55		645.305	.0004	"	.1	177	73	54	243	265	43		1
12 6	60	2106	646.235	.0004	.096	.1	177	74	54	243	263	44		1
13 1	65		647.120	.0004		.1	177	75	57	240	268	45		1
14 1	70		648.075	.0007	.168	.17	177	77	59	241	257	45		2
15 2	75		648.825	.0006	.144	.14	177	78	59	241	257	46		2
16 2	80		649.800	.0004		.1	177	79	61	241	257	47		2
17 3	85		651.100	.0004		.1	177	79	61	241	257	47		2
18 3	90		652.175	.0006	.144	.14	177	79	61	241	257	47		2
19 4	95		653.500	.0008	.22	.22	177	79	61	241	257	47		2
20 4	100		654.751	.0008	.22	.22	177	80	62	240	257	45		2½
21 5	105		656.311	.0008	.22	.22	177	82	62	240	257	45		2½
22 5	110		657.353	.0006	.167	.17	178	80	65	241	257	44		2
23 6	115		658.400	.0006	.167	.17	178	80	65	241	258	44		2
24 6	120	2206	659.547	.0006		.17	178	82	65	241	251	45		2
25														

Notes:

1WC

Field Data Sheet

arizon engineering

Date 11-16-98
Test Method OQER 7
Concurrent Testing VOC
Run # 3 cont
Operator DRB Support CDB
Temperature, Am (Ta) 40
Pressure, Bar (Pb) 30.05
Pressure, Static (Pstat) 0
Filters

Client/Plant/Location: OSV West
Probe 3-1 Cp .79 Heat Set 250
Pilot Pretest in In/mi
Leak Check Post 0.00 in 4 In/mi
Nozzle .9880
Sample Box 3 Heat Set
Meter Box 9 dH@ 1.82334 Y 0.99062
Meter Pretest 0 cfm 16 InHg
Leak Check Post 0.005cfm 10 InHg
Moisture 45 Tdb Twb

Stack Diagram
Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Orifice Pressure (dH@) (dH's)	Meter Pressure (dH@) (dH@corr)	Velocity Pressure (dP) (Actual) (dH)	STACK °F (Ts) Amb:	AFTER Inlet/Avg °F (Tm-in) Amb:	AFTER 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 (Ps)
		2216	659.547											
1	2:25	21	661.125	.0011	.308	.31	176	74	67	238	247	42		3
1	2:30	26	662.920	.0013	.363	.36	175	77	66	241	246	42		3
2	2:35	31	664.750	.0013		.36	175	80	67	240	245	43		3
2	2:20	36	666.140	.0013		.36	175	83	67	239	245	45		3
3	2:25	41	667.533	.0007	.196	.20	175	86	67	239	245	47		3
3	2:30		668.872	.0007	.196	.20	175	86	67	239	245	48		3
4	2:35	51	670.075	.0007	.196	.20	175	86	67	240	245	50		3
4	2:40	22:56	671.423	.0007	.96	.20	175	86	68	240	245	52		3
5	2:45	01		.0000		0	173	69	69	242	247	47		0
5	2:50			.0000		0	173	69	69	242	247	47		0
6	2:55	11		.0000		0	173	69	69	242	247	47		0
6	3:00			.0000		0	173	69	69	242	247	47		0
6	3:05	1121		.0000		0	173	69	69	242	247	47		0
6	3:10			.0000		0	173	69	69	242	247	47		0
5	3:15	31		.0000		0	173	69	69	242	247	47		0
5	3:20	36	671.423	.0000		0	173	69	69	242	247	47		0
4	3:25													
4	3:30													
3	3:35													
3	3:40													
2	3:45													
2	3:50													
1	3:55													
1	4:00													

Notes:

Field Data Sheet

2

Client/Plant/Location: OSU East

Date 11-16-98

Test Method 00E07

Concurrent Testing VOC

Run # 4

Operator DRB Support COB

Temperature, Amb (Ta) 42

Pressure, Bar (Pb) 30.05

Pressure, Static (Pstat) 0

Probe 3-2 Cp .805 Heat Set 250

Pilot Pretest 0.00 in 4 in/m

Leak Check Post in in/m

Nozzle .9880

Sample Box Heat Set 250

Meter Box 6 dH@ 1.69025 Y .99086

Meter Pretest 0.010 cfm 12 in/l

Leak Check Post cfm in/l

Moisture 40 Tdb Twb

Filters

Cyclonic Flow ?

Stack Diagram

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)	Orifice Pressure in H2O Actual (dH)	STACK °F (Ts) Anal:	PROBE °F (Tp) Anal:	Probe Outlet °F (Tm out) Anal:	IMPINGER °F (Ti) Anal:	OVEN Filter °F (To) Anal:	IMPINGER Outlet °F (Ti) Anal:	AUX °F (Ta)	Pump Vacuum in Hg (Ps)
		2348	301.265											
1	5		303.121	.0010	.301	.30	172	57	58	264	268	40		5
1	10		304.–	.0006	.177	.18	173	57	58	264	264	41		5
2	15		305.–	.0008		.18	173	61	58	261	268	44		5
2	20		306.–	.0006		.18	173	61	58	261	268	44		5
3	25		307.740	.0009		.28	173	61	58	261	268	44		5
3	30		309.420	.0008	.235	.24	173	61	58	261	268	44		5
4	35		310.605	.0004	.117	.12	173	62	59	255	255	45		4½
4	40		311.821	.0004	.117	.12	173	62	59	251	255	46		5
5	45		312.920	.0005		.10	173	63	59	250	258	46		5
5	50		314.395	.0002		.10	172	63	60	250	258	48		5
6	55		315.882	.0003	.088	.09	172	64	61	249	258	49		5
6	60		316.882	.0004	.117	.12	172	65	61	249	258	49		5
6	65		317.941	.0004		.12	172	65	61	248	258	49		5
6	70		319.050	.0004		.12	173	65	62	249	258	54		5
5	75		321.190	.0007	.209	.21	173	65	62	249	256	54		5½
5	80		522.399	.0009		.27	173	67	63	249	258	61		6
4	85		523.998	.0009		.27	173	67	63	249	258	61		6
4	90		525.421	.0006	.149	.15	169	67	64	249	256	57		5
3	95		526.800	.0005	.149	.15	168	68	64	249	256	57		5
3	100		328.025	.0005	.149	.15	168	68	64	249	257	57		5
2	105		329.053	.0005	.149	.15	168	68	64	249	255	57		5
2	110		330.121	.0005	.149	.15	167	68	65	248	252	58		5
1	115		331.975	.0004	.121	.12	168	68	65	247	255	58		5
1	120	1:48 pm	333.333	.0004	.121	.12	168	68	66	248	255	58		5

Notes:

Field Data Sheet

2

Client/Plant/Location: OSU East

Date 11-17-98

Test Method 00E07

Concurrent Testing VOC

Run # 4 cont

Operator DRB Support COB

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.05

Pressure, Static (Pstat) 0

Filters

Probe 3-2 Cp .805 Heat Set 250

Pitot Pretest 0.00 in 4 In/mi

Leak Check Post 0.00 in 4 In/m

Nozzle .988

Sample Box Heat Set

Meter Box 6 dH@ 1.69025 Y 0.99085

Meter Pretest cfm Inf

Leak Check Post 0.009 cfm 10 Inf

Stack Diagram

Cyclonic Flow ?

Moisture 35

Traverse Point Number	Sampling Time min (dt)	Check Time (Time)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE Inlet/Avg °F (Tm In/Avg) Amb:	SILICA GEL Outlet °F (Tm out) Amb:	IMPINGER Tdb °F (Tp) Amb:	OVEN Filter °F (Tf) Amb:	IMPINGER Twb Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Ps)
		1:49	333.333											
1	5		334.696	.0003	.104	.11	167	67	67	245	256	58		5
1	10		335.521	.0003	.109	.11	167	68	66	245	255	55		5
2	15		336.227	.0001	.036	.04	160	68	66	249	255	49		4
2	20		336.775	.0001	.036	.04	160	68	66	250	255	49		4
3	25		337.248	.0001	.036	.04	160	68	66	250	255	45		4
3	30		338.350	.0003	.108	.11	167	68	66	240	255	50		4
4	35		339.570	.0003	.108	.11	168	68	66	240	258	52		4
4	40		340.880	.0003		.11	167	69	68	248	253	52		5
5	45		342.320	.0003		.11	167	69	67	248	254	52		5
5	50		343.8	.0004	.217	.22	166	69	68	250	258	55		5
6	55		345.2	.0006		.21	166	69	69	249	256	56		5
6	60		346.7	.0006		.21	166	69	69	249	257	56		5
6	65		348.1	.0006		.21	166	69	69	249	252	58		5
6	70		349.5	.0006		.21	166	70	69	249	252	59		5
5	75		351.3	.0006		.21	166	70	69	249	252	60		5½
5	80		352.89	.0006		.21	166	71	69	249	252	63		5½
4	85		355.	.0006		.21	166	71	69	249	252	64		5½
4	90		357.016	.0006		.21	166	70	69	249	258	64		5½
3	95		358.721	.0008	0.289	.29	166	72	69	249	255	57		7
3	100		360.672	.0009	.325	.33	166	72	69	250	256	54		7
2	105		362.690	.0009		.33	166	72	69	250	255	53		7
2	110		365.000	.0015	542	0.54	164	72	69	256	257	49		8
1	115	3:44	367.487	.0014	.506	.51	165	72	69	249	255	49		8
1	~~120 3:49~~													

Notes:

2WA

Field Data Sheet

[redacted] orizon [redacted] ngineering

Client/Plant/Location: OSO West

Date 11-17-98

Test Method CQEQ7

Concurrent Testing VOC

Run # 5 West

Operator DRB Support CDB

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.05

Pressure, Static (Pstat) 0

Probe 3-1 Cp .79 Heat Set 280

Pitot Pretest .0008 in 54.0 in/m

Leak Check Post in in/m

Nozzle .7880

Sample Box 2 Heat Set 260

Meter Box 9 dH@ 1.8 Y .92

Meter Pretest 0.008 cfm 14 inH

Leak Check Post cfm inH

Filters Cyclonic Flow ? Stack Diagram Moisture 35 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 (dH@)	Orifice Pressure inH2O ACTUAL (dH)	Stack °F (Ts) Amb:	Probe °F Inlet/Avg (Tm-in) Amb:	Probe °F Outlet (Tm-out) Amb:	Fuse °F (Tp) Amb:	Oven Filter °F (To) Amb:	Impinger Outlet °F (Ti) Amb:	Aux °F (Ta)	Flow Vacuum inH (Pv)
		359	671.927											
1	5		674.475	.0045 .0060	1.706	1.7	159	56	55	239	246	45		9
1	10		675.994	.0007	.266	.27	160	57	55	240	246	46		2
2	15		678.312	0.0018	.679	.68	161	60	54	241	245	46		2½
2	20		678.8	0.0010 0.0018	.374 .674	.38 .68	161	60	54	241	245	46		2½
3	25		679.	0.0010	.374	.38	163	69	56	238	246	48		3
3	30		679.	.0008		.34	163	71	57	240	245	50		3
4	35		680.	.0008		.34	163	71	57	240	245	50		3
4	40		680.	.0010		.34	163	72	58	240	245	55		3
5	45		681.	.0010		.34	163	74	60	240	245	56		3
5	50		681.	.0010		.34	163	76	62	240	245	55		3
6	55		682.	.0010		.34	163	80	63	240	245	58		3
6	60		693.430	.0010		.34	163	84	63	240	245	58		3
6	1:05		.	.0009		.34	163	84	63	240	245	54		3
6	1:10		.	.0008		.34	163	84	63	240	245	54		3
5	1:15		698.290	.0003		.34	163	84	63	240	245	54		3
5	1:20		699.322	.0002	.075	.08	163	82	65	239	245	54		3
4	1:25		700.335	.0009	.328	.34	163	82	65	240	245	54		3
4	1:30		701.600	.0004	.153	.15	161	84	65	241	245	54		2
3	1:35		702.120	.0010		.36	162	85	66	240	246	55		3
3	1:40		704.724	0.0010		.36	162	85	66	241	246	55		3
2	1:45		705.985	0.0004	.153	.15	162	86	66	241	246	55		2
2	1:50		708.256	0.0015	0.668	.67	162	86	67	240	245	56		5
1	1:55		710.750	0.0017	.757	.76	163	87	68	241	244	60		6
1	2:00	559	713.218	0.0017		.176	163	86	68	241	243	60		6

Notes:

2WB

Field Data Sheet

Horizon Engineering

Date	11/17/98
Test Method	OOEQ 7
Concurrent Testing	VOC
Run #	5 Cont
Operator	DRB Support CDB
Temperature, Amb (Ta)	42
Pressure, Bar (Pb)	30.05
Pressure, Static (Pstat)	0
Filters	

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location :	OSU/West
Probe	3-1 Cp .79 Heat Set 250
Pitot Leak Check	Pretest in in/min; Post 0.0 in 6 in/in.
Nozzle	.988
Sample Box	Heat Set 250
Meter Box	7 dH@ 1.82 Y .99
Meter Leak Check	Pretest cfm in Hg; Post 0.001 cfm 18 in Hg
Moisture	35 Tdb Twb

#	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 (Ta)	Pump Vacuum in Hg (Pv)
			600	713.218				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	1	5		716.925	0.0035	1.559	1.55	155	76	69	245	250	57		11
2	1	10		719.822	.0025	1.10	1.1	163	82	70	247	251	5.2		8 1/2
3	2	15		722.02	.0017	.745	.75	163	82	70	247	250	56		6
4	2	20		724.32	.0020		.65	162	89	70	248	240	50		7
5	3	25		726.82	.0018		.65	162	89	70	248	240	50		7
6	3	30		729.41	.0016		.75	162	89	70	248	230	50		7
7	4	35		731.211	.0017		.75	162	89	70	248	237	50		7
8	4	40		733.721	0.0019	.831	.83	162	89	71	248	236	50		7
9	5	45		735.999	0.0015	.660	.66	162	89	70	248	250	49		6
10	5	50		738.460	.0020	.879	.88	162	89	70	250	250	44		8
11	6	55		741.071	.0020		.88	162	89	70	244	251	44		8
12	6	60		744.505	.0035	1.54	1.55	162	80	71	250	250	44		14
13	6	1:05		746.865	0.0018	.791	.79	162	80	71	251	250	44		13
14	6	1:10		749.949	0.0031	1.363	1.35	154	82	70	239	250	43		13
15	5	1:15		753.979	0.0024	1.05	1.05	155	80	70	248	250	44		11
16	5	1:20		756.032	0.0028	1.23	1.20	158	81	70	247	250	43		12
17	4	1:25	725	759.172	0.0027	1.21	1.2	160	81	70	243	250	44		11
18	~~4~~	~~1:30~~	~~730~~												
19															
20															
21															
22															
23															
24															
25															

Notes:

Field Data Sheet

3

Client/Plant/Location: OSU / East

Date 11-17-98

Test Method 40 CFR 7

Concurrent Testing RSA

Run # 6

Operator CDB Support DRB

Temperature, Amb (Ta) 45

Pressure, Bar (Pb) 30.09

Pressure, Static (Pstat) 0

Filters

Probe 3-2 Cp .805 Heat Set

Pilot Pretest 4 in 0.0 lpm

Leak Check Post in lpm

Nozzle .988

Sample Box Heat Set

Meter Box 6 dH@ 1.69025 Y 0.99086

Meter Pretest 0.008 cfm 15 inH

Leak Check Post cfm inH

Moisture 25 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DeltaH	Probe Pressure inH2O Actual (-PH)	STACK °F (Ts) Amb:	Aft Imp Inlet/Aux °F (Tm in) Amb:	Aft Imp Outlet °F (Tm out) Amb:	Probe °F (Tp) Amb:	Oven Filter °F (To) Amb:	Impinger Outlet °F (Ti) Amb:	Aux °F (Ta)	Pump Vacuum inH2O (Pv)
Start Port		8:12	368.159											
1	5		372.45	.0051	2.4256	2.4	151	59	58	251	257	41		14
1	10		375.28	.0020	.9512	.95	153	60	58	245	254	42		8
2	15		378.92	.0030	1.4268	1.4	156	61	58	242	254	44		10
2	20		380.80	.0007	.3329	.33	155	62	60	250	254	44		6
3	25		381.92	.0002	.0951	.10	155	65	60	250	254	45		4
3	30		384.28	.0011	.5232	.52	156	65	60	246	258	44		6
4	35		387.23	.0020	.9512	.95	161	67	61	248	257	43		9
4	40		391.80	.0038	1.8093	1.8	164	69	62	246	253	44		13
5	45		393.00	.0002	.0951	.10	157	70	63	246	256	48		5
5	50		393.86	.0004	.1902	.20	157	68	64	246	255	46		5
6	55		395.05	.0004	.1902	.20	158	68	64	246	255	46		5
6	60	912	397.753	.002	.9512	.95	165	69	65	250	259	45		9
1	5	914	401.61	.0035	1.6646	1.7	158	71	66	260	251	46		12
1	10		402.69	.0041	.4976	.48	157	72	66	245	254	46		7
2	15		403.79	.0010	.4756	.48	168	74	68	246	253	48		7
2	20		405.90	.003	1.4268	1.4 .48	160	74	68	246	254	49		7
3	25		409.76	.003	1.4268	1.4	164	74	68	250	254	52		7
3	30		412.75	.0004	.1902	.20	159	74	69	250	258	52		5
4	35		414.25	.0004	.1902	.20	157	75	69	251	255	49		5
4	40		416.75	.0004	.1902	.20	158	76	70	251	252	48		5
5	45		419.25	.0004	.1902	.20	158	76	71	250	252	48		5
5	50		418.51	.0004	.1902	.20	158	77	73	249	253	47		5
6	55		419.91	.0004	.1902	.20	157	77	73	250	255	47		5
6	60		420.830	.0002	.0951	.10	156	76	73	249	253	51		4

Notes: Damper switch @ 7:45

3

Field Data Sheet

Orizon Engineering

Date 11/17/98
Test Method ODEQ7
Concurrent Testing 25A
Run # 6
Operator CDB Support DKB
Temperature, Amb (Ta) 55
Pressure, Bar (Pb) 30.09
Pressure, Static (Pstat) 0
Filters

Client/Plant/Location: OSU East
Probe 3-2 Cp .805 Heat Set 250
Pitot Pretest in in/ml
Leak Check Post in in/ml
Nozzle
Sample Box Heat Set 250
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest cfm inHg
Leak Check Post .01 cfm 15 inHg

Stack Diagram

Cyclonic Flow ?

Moisture 25 Tdb Twb

Traverse Point Number	Sampling Time min (Δt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (ΔPs)	Orifice Pressure inH2O (ΔH)	Orifice Pressure inH2O (ΔH@)	STACK °F (Ts) Amb:	PROBE °F Inlet/Avg (Tm In) Amb:	PROBE °F Outlet (Tm out) Amb:	FRONT °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Ps)
1	5	1020	420.830											
1	5		423.74	.0017	.8085	.81	163	77	75	247	255	50		8
1	10		424.64	.0002	.0951	.10	159	78	75	250	252	54		4
2	15		425.88	.0002	.0951	.10	160	78	76	250	257	55		4
2	20		427.49	.0003	.1427	.14	159	79	77	250	256	52		5
3	25		428.87	.0002	.0951	.10	161	80	77	251	254	52		4
3	30		430.70	.0003	.1427	.14	157	81	78	251	255	54		5
4	35		432.83	.0012	.4756	.48	161	83	79	246	255	50		6
4	40		434.18	.0004	.1902	.20	159	83	80	249	254	55		5
5	45		436.75	.0013	.6183	.62	164	84	81	251	251	57		7
5	50		438.25	.0004	.1902	.20	158	85	81	250	251	55		5
6	55		439.03	.0002	.0951	.10	159	86	82	251	257	56		4
6	60	1120	439.764	.0002	.0951	.10	161	85	82	251	255	57		4
1	5	1125	441.10	.0002	.0951	.10	149	85	84	248	254	55		4
1	10	30	442.75	.0003	.1427	.14	154	86	84	250	256	52		4
2	15	35	445.24	.0013	.6183	.62	160	86	84	248	252	52		7
2	20	40	446.45	.0003	.1427	.14	160	86	84	246	245	54		4
3	25	45	447.334	.0003	.1427	.14	159	86	84	249	248	56		4
3	30		stopped at 23⅝											
4	35													
4	40													
5	45													
5	50													
6	55													
6	60													

West Port

South Port

Notes: Damper switch @ 11:49
Electrical Problems result in delayed switch over

3WA

Field Data Sheet

arizon | ngineering

Date 11/17/98
Test Method OOEQ7
Concurrent Testing 25A
Run # 7
Operator CDB Support DRB
Temperature, Amb (Ta) 60
Pressure, Bar (Pb) 30.09
Pressure, Static (Pstat) O

Client/Plant/Location: OSU West
Probe 3-1 Cp .79 Heat Set 250
Pitot Pretest 4 in O in/mi
Leak Check Post in in/mi
Nozzle ~~Dea~~ 5 Bo1 .9880
Sample Box Heat Set 250
Meter Box 9 dH@ 1.82334 Y .99062
Meter Pretest O cfm 15 inH
Leak Check Post cfm inH

Stack Diagram

Cyclonic Flow ?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	AIR/H2O Inlet/Avg °F (Tm in) Amb:	AIR/H2O Outlet °F (Tm out) Amb:	OVEN Probe °F (Tp) Amb:	OVEN Filter °F (Tf) Amb:	IMPINGER Outlet °F (Ti) Amb:	Aux °F (Ta)	Temp Vacuum inHg (Pv)
		1222	759.543											
South Port 1	5		761.68	.0013	.6424	.64	149	66	67	248	211	50		16
1	10		763.77	.0015	.6424	.64	149	66	66	246	248	48		15
2	15		767.64	.0010	.4942	.49	153	68	66	246	248	49		9
2	20		769.94	.0010	.4942	.49	154	66	67	246	248	50		8
3	25		772.49	.0010	.4942	.49	154	66	68	245	248	51		8
3	30		774.99	.0010	.4942	.49	155	66	69	244	248	52		8
4	35		778.32	.0010	.4942	.49	156	66	70	244	249	53		7
4	40		780.34	.0013	.6424	.64	156	90	71	243	253	54		4
5	45		782.68	.0014	.6919	.69	155	91	71	245	248	54		5
5	50		784.57	.0010	.4942	.49	155	93	72	246	248	54		4
6	55		786.93	.0013	.6424	.64	155	92	71	245	247	57		5
6	60	1322	788.860	.0010	.4942	.49	155	93	73	242	248	58		5
East Port 1	5	1326	790.08	.0003	.1483	.15	181	83	75	242	200	62		3
1	10		791.20	.0003	.1483	.15	148	86	76	244	248	59		3
2	15		792.36	.0003	.1483	.15	154	87	75	240	248	52		3
2	20		793.52	.0003	.1483	.15	155	87	75	246	248	51		2
3	25		794.47	.0002	.0988	.10	152	88	75	247	245	52		2
3	30		795.40	.0002	.0988	.10	155	87	74	246	248	53		2
4	35		796.36	.0002	.0988	.10	155	86	75	245	246	53		2
4	40		797.87	.0005	.2471	.25	154	88	75	247	246	52		3
5	45		798.80	.0002	.0988	.10	155	90	74	245	247	54		3
5	50			.0002	.0988	.10	154	88	75	246	246	54		3
6	55			0.000	0	0	155	87	75	247	244	54		0
6	60	1426	798.888	0.000		0								
						0								

Notes:

3WB

Field Data Sheet

[21] onizon [3] ngineering

Client/Plant/Location: OSU West

Date 11/17/98

Test Method 5 OOEQ 7

Concurrent Testing 25A

Run # 7

Operator CDB Support DRB

Temperature, Amb (Ta) 60

Pressure, Bar (Pb) 30.09

Pressure, Static (Pstat) 0

Probe 3-1 Cp .79 Heat Set 250

Pilot Pretest in in/mi

Leak Check Post in in/mi

Nozzle 5 Bal .9880

Sample Box Heat Set 250

Meter Box 9 dH@ 1.82334 Y .99062

Meter Pretest 0 cfm 15 inHg

Leak Check Post 0 cfm 17 inHg

Filters

Stack Diagram

Cyclonic Flow ?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH) DESIRED	Orifice Pressure inH2O (dH) ACTUAL (dH)	Stack Temp °F (Ts) Amb:	Dry Gas Meter Inlet/Avg °F (Tm in/avg) Amb:	Dry Gas 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)
		1428	798.808											
1	5		— . —	.0017	.8401	.84	151	78	77	249	250	51		5
1	10		804.95	.0018	.8895	.89	155	85	76	245	248	52		5
2	15		— . —	.0015	.7413	.74	155	87	76	259	248	52		6
2	20		809.77	.0019	.9389	.94	155	91	76	244	248	52		6
3	25		812.13	.0014	.6919	.69	155	91	76	239	248	53		5
3	30		814.92	.0020	.9884	.99	155	92	75	246	248	52		6
4	35		817.62	.0018	.8895	.89	155	93	76	239	247	54		5
4	40		820.10	.0016	.7907	.79	155	93	76	246	248	54		5
5	45		822.75	.0016	.7907	.79	155	94	76	239	248	54		5
5	50		825.12	.0015	.7413	.74	155	94	76	245	248	54		5
6	55		827.43	.0014	.6919	.69	154	94	76	246	248	55		5
6	60	1528	829.598	.0013	.6424	.64	155	94	76	246	248	57		5
1	5		832.18	.0017	.8401	.84	155	85	76	243	247	56		6
1	10		834.52	.0014	.6919	.69	155	89	77	246	248	62		5
2	15		836.85	.0013	.6424	.64	155	91	76	247	248	62		5
2	17 39/100	15:49	837.840	.0013	.6424	.64	155	92	76	246	247	64		5
3	25		stopped @ 17.39/100											
3	30													
4	35													
4	40													
5	45													
5	50													
6	55													
6	60													

Notes:

Damper switch @ 15:49

Nozzle in South Port

Nozzle out South Port

4

Field Data Sheet

Horizon Engineering

Date	11/17/98
Test Method	ODEQ 7
Concurrent Testing	25A
Run #	8
Operator	CDB
Support	DRB
Temperature, Amb (Ta)	60
Pressure, Bar (Pb)	30.09
Pressure, Static (Pstat)	0

Client/Plant/Location: OSU East

Probe	3-2
Cp	.80537
Heat Set	250
Pitot Leak Check	Pretest 5 in 0 in/... ; Post in in/...
Nozzle	5 601 .980
Sample Box	Heat Set 250
Meter Box	6
dH@	1.69025
Y	.99086
Meter Leak Check	Pretest .004 cfm 15 in. ; Post cfm in.
Moisture	25
Tdb	
Twb	

Filters

Cyclonic Flow ?

Stack Diagram

Row	Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (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)	Fo... Vac in (...)
			1607	448.945				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1	1	5		450.67	.0004	.1904	.2	150	65	65	249	255	51	5	
2	1	10		452.40	.0002	.0952	.10	151	65	65	247	255	49	5	
3	2	15		453.56	.0002	.0952	.1	151	65	64	247	255	50	4	
4	2	20		454.72	.0002	.0952	.1	150	65	65	249	254	51	4	
5	3	25		455.88	.0002	.0952	.1	150	65	65	249	254	52	4	
6	3	30		456.30	.0001	.0476	.04	150	66	64	249	255	53	4	
7	4	35		457.06	.0001	.0476	.04	150	66	64	248	255	53	4	
8	4	40		458.62	.0001	.0476	.04	152	66	65	249	252	53	4	
9	5	45		459.84	.0002	.0952	.1	154	66	65	249	251	53	4	
10	5	50		461.12	.0002	.0952	.1	156	67	65	247	252	51	4	
11	6	55		462.40	.0002	.0952	.1	155	68	65	248	253	51	4	
12	6	60	1707	463.974	.0003	.1428	.14	155	68	65	248	252	51	5	
13	1	5	1711	465.40	.0002	.0952	.1	151	68	65	251	256	51	5	
14	1	10		467.08	.0003	.1428	.14	151	68	66	249	254	49	5	
15	2	15		468.59	.0003	.1428	.14	151	68	65	249	254	47	5	
16	2	20		469.74	.0002	.0952	.1	156	68	65	249	256	48	4	
17	3	25		470.41	.0001	.0476	.05	158	68	65	251	255	49	4	
18	3	30		471.60	.0002	.0952	.1	159	68	65	251	254	51	5	
19	4	35		473.45	.0005	.2381	.24	159	68	65	250	252	50	6	
20	4	40		475.23	.0005	.2381	.24	159	68	66	250	257	48	6	
21	5	45		476.74	.0004	.1904	.19	159	68	65	250	251	49	5	
22	5	50		478.22	.0004	.1904	.19	159	69	66	250	258	51	5	
23	6	55		479.39	.0003	.1428	.14	156	69	66	250	253	51	5	
24	6	60	1811	480.283	.0002	.0952	.10	159	68	66	250	255	52	5	
25															

South Port (rows 1–12); West Port (rows 13–24)

Notes:

Field Data Sheet

4

arizon ngineering

Date 11/17/98

Test Method 0050.7

Concurrent Testing 25A

Run # 8

Operator CDB Support DRB

Temperature, Am (Ta) 60

Pressure, Bar (Pb) 30.09

Pressure, Static (Pstat) 0

Client/Plant/Location: 05U East

Probe 3-2 Cp .8053 7 Heat Set 250

Pitot Prefest 5 in 0 lb/in

Leak Check Post in lb/in

Nozzle 5 BC1 .9880

Sample Box Heat Set 250

Meter Box 6 dH@ 1.69025 Y .99086

Meter Prefest .004 cfm 15 lnl

Leak Check Post .02 cfm 08 lnl

Filters

Cyclonic Flow ?

Stack Diagram

Moisture 25 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH)	Orifice Pressure inH2O Actual (dH)	STACK °F (Ts) Amb:	PROBE Inlet/Avg °F (Tm in) Amb:	PROBE Outlet °F (Tm out) Amb:	FRONT °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pitot Vacuum inH2O (Pv)
	1817	1817	480.283											
1	5		481.83	.0004	.1904	.19	159	67	68	249	255	48		4
1	10		483.09	.0003	.1428	.14	159	67	66	250	253	47		4
2	15		484.33	.0003	.1428	.14	159	67	65	250	251	47		4
2	20		485.55	.0003	.1428	.14	159	67	65	250	253	47		4
3	25		486.80	.0002	.0952	.10	159	67	65	250	254	48		4
3	30		488.42	.0004	.1904	.19	159	67	65	250	254	48		4
4	35			.0003	.1428	.14	158	68	65	249	254	46		4
4	40		491.05	.0003	.1428	.14	158	68	65	249	255	46		4
5	45		492.26	.0002	.0952	.10	158	68	65	249	252	46		4
5	50		494.04	.0004	.1904	.19	158	68	65	247	252	46		4
6	55		495.56	.0004	.1904	.19	158	69	65	249	255	46		4
6	60	1917	497.078	.0004	.1904	.19	158	69	66	248	254	46		4
1	5	1922	498.88	.0003	.1428	.14	149	68	66	248	256	47		5
1	10		500.56	.0004	.1904	.19	156	68	66	247	257	47		5
2	15		502.26	.0004	.1904	.19	157	69	66	247	256	47		5
2	20		503.79	.0005	.2381	.24	157	69	66	247	256	47		5
3	25		505.83	.0005	.2381	.24	157	69	66	247	257	48		5
3	30	26 8/10	506.470	.0004	.1904	.19	157	70	66	247	253	49		5
4	35	1949												
4	40													
5	45													
5	50													
6	55													
6	60													

West 1-4

Notes: Damper Switch @ 1949

4WBA

Field Data Sheet

arizon ngineering

Date 11-17-98
Test Method 00EQ7
Concurrent Testing 25A
Run # 9
Operator DRB Support CDB
Temperature, Amb (Ta) 48
Pressure, Bar (Pb) 30.08
Pressure, Static (Pstat)
Filters

Stack Diagram
Cyclonic Flow ?

Client/Plant/Location: OSU west
Probe S-1 Cp .79 Heat Set 250
Pitot Pretest in in/m
Leak Check Post in in/m
Nozzle .988
Sample Box Heat Set
Meter Box 9 dH@ 1.82 Y .99
Meter Pretest 0.013 cfm 15 inH
Leak Check Post cfm inH
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 (dH)	Orifice Pressure inH2O AVERAGE (dH)	PROBE °F (Ts) Ambient	STACK Inlet/Aug °F (Tm-in) Ambient	STACK Outlet °F (Tm-out) Ambient	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti) Ambient	AUX °F (Ta)	Pump Vacuum inH (Pv)
		2005	838.355											
1	5		840.41	.0010	.547	.55	146	57	56	246	247	<68		4
1	10		842.510	.0010		.55	147	65	57	245	247	.		4
2	15		844.5	.0011		.55	147	66	57	245	247			4
2	20		846.530	.0010		.55	147	68	57	245	247			4
3	25		848.600	.0011		.55	150	75	59	245	248			4
3	30		850.	.0010		.55	154	79	59	245	247	45		4
4	35		852.	.0010		.55	154	80	60	248	248	45		4
4	40		854.	.0009		.55	154	83	62	248	248	45		4
5	45		856.941	.0006		.55	154	85	63	248	248	45		4
5	50		858.675	.0007	.388	.39	154	85	63	248	248	45		3
6	55		860.12	.0006	.332	.33	154	85	63	249	247	45		3
6	60		861.812	.0006		.31	153	86	64	249	248			3
6	1:05		863.42	.0006		.34	153	86	64	249	248			3
6	1:10		865.135	.0006		.34	153	86	64	249	247			3
5	1:15		866.72	.0006		.34	153	87	66	250	250			3
5	1:20		868.31	.0006		.33	154	87	67	250	248			3
4	1:25		869.83	.0006		.33	154	88	68	250	248			3
4	1:30		871.590	.0006		.33	154	89	68	249	248			3
3	1:35		873.020	.0006		.33	154	89	69	249	246			3
3	1:40		874.72	.0005		.33	153	90	70	250	250			3
2	1:45		876.322	.0006		.33	153	90	70	250	250			3
2	1:50		877.370	.0002	.111	.11	150	89	70	249	247			2
1	1:55		878.8	.0006	.332	.33	150	89	70	249	248			3
1	2:00	2205	880.500	.0005	.332	33	150	89	70	249	247			3

Notes:

4WAB

Field Data Sheet

[redacted] orizon [redacted] ngineering

Date 11-17-98
Test Method OOEQ7
Concurrent Testing 25A
Run # 9 Cont
Operator DRO Support COB
Temperature, Am (Ta) 45
Pressure, Bar (Pb) 30.08
Pressure, Static (Pstat)

Client/Plant/Location: 050 west

Probe 3-[Cp .79 Heat Set 250
Pilot Pretest in in/mi
Leak Check Post 4 in 0.0 in/mi
Nozzle 988
Sample Box Heat Set 250
Meter Box 9 dH@ 1.82 Y 0.99
Meter Pretest cfm in/lg
Leak Check Post 0.008 cfm 6 in/lg
Moisture 20 Tdb Twb

Stack Diagram

Filters

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cu ft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH@)	Orifice Pressure inH2O Actual (dH)	STACK °F (Ts) Amb:	PROBE °F (Ts Avg)	SILICA Outlet °F (Ts or out)	OVEN °F (Tp) Amb:	OVEN Filter °F (Tp) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		2212	880.500											
1	05		881.621	0.0003	.1620	.17	154	87	70	249	248	68		2
1	10		882.981	0.0003		.17	154	87	70	248	248			2
2	15		884.385	.0005	.222	.25	155	88	71	248	248			2 1/2
2	20		885.1	.0004	.278	.25	155	88	71	249	248			2 1/2
3	25		887.000	.0002	.111	.11	154	89	71	250	248			2
3	30		887.795	.0002	.111	.11	154	89	71	250	249			2
4	35		889.62	.0010	.557	.56	154	90	71	250	249			5
4	40		891.91	.0011	.623	.561	154	90	71	250	249			5
5	45		894.2	.0009		.56	154	88	72	250	250			5
5	50		896.220	.0011		.56	154	88	72	249	249			5
6	55		898.218	.0010		.56	154	90	72	249	249			5
6	3:00	2342	900.200	.0009	.507	.51	154	90	72	249	249			5
6	3:05		901.840	.0006	.338	.34	153	93	73	249	247			4
6	3:10		903.440	.0006		.34	153	93	73	249	248			4
5	3:15	2327	905.189	.0007	.391	.39	153	93	73	249	248			4
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

5

[redacted] onizon [redacted] ngineering

Date 11-17-98

Test Method 00507

Concurrent Testing 25A

Run # 10

Operator DRB Support COB

Temperature, Am (Ta) 46

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters

Client/Plant/Location: OSU East

Probe S-2 Cp .805 Heat Set 250

Pitot Pretest 4 in 0 in/n

Leak Check Post in in/n

Nozzle .1080

Sample Box Heat Set 250

Meter Box 6 dH@ 1.69 Y .99084

Meter Pretest 0.004 cfm 14 inl

Leak Check Post cfm inl

Moisture 20 Tdb Twb

Stack Diagram

Cyclonic Flow?

Traverse Point Number	Sampling Time min (dt)	Clock Time (Military)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (dP) in H2O	Orifice Pressure Differential (dH) in H2O	Calculated Avg dP in H2O	Stack Temperature °F (Ts)	Probe Temperature °F (Tn) Actual	Filter Temperature °F (Tf) Actual	Impinger Outlet °F (Ti) Actual	Oven Temperature °F (To) Actual	Impinger Outlet °F (Ti)	Aux °F (Ta)	Vacuum in Hg (Vac)
		(23:48)	506.872											
1	5	1148	508.970	.0010	.524	.52	132	62	61	250	257	44		6
1	10		509.62	.0004	.2095	.21	146	62	61	248	252	45		4½
2	15		512.0	.0005	.263	.26	146	62	61	247	251	46		5
2	20		514.230	.0006	.30	.30	149	64	62	248	251	46		5
3	25		516.250	.0006	.3	.30	149	64	62	248	251	46		6
3	30		518.	.0005		.30	150	66	63	248	853	45		6
4	35		520.	.0005		.30	150	66	63	249	251	44		6
4	40		522.			.31	150	68	64	250	250	44		6
5	45		524.			.31	150	69	64	250	250	45		6
5	50		526.275			.31	153	70	65	250	250	46		6
6	55		527.700	.0002	.105	.11	157	71	65	250	250	47		6 3
6	60	048	528.740	.0002		.11	154	70	66	250	250	47		3
6	65		530.234	.0004	.211	.21	155	70	66	750	250	47		5
6	70		531.621	.0004	.21	.21	156	70	66	254	750	47		5
5	75		533.333	.0002	.105	.21	157	71	68	750	249	48		4
5	80		534.745	.0002	.11	.11	157	71	68	250	249	48		4
4	85		535.92	.0002	.11	.11	157	71	68	750	241	48		4
4	90		537.7	.0002		.11	156	72	69	250	249	49		4
3	95		538.421	.0002		.11	156	72	69	250	249	49		4
3	100		540.9	.0006	.315	.32	156	72	69	250	249	49		6
2	105		542.2	.0006		.32	157	74	69	251	248	52		6
2	110		544.000	.0006		.32	157	74	69	251	248	53		6
1	115		545.955	.0006		.32	157	74	69	250	250	53		6
1	120	148	547.878	.0006		.32	157	74	70	250	255	55		6

Notes:

Field Data Sheet

5

[2] orizon [3] ngineering

Date 11-18-98
Test Method OOEQ 7
Concurrent Testing 25A
Run # 10 cont
Operator BB Support CDC
Temperature, Amb (Ta) 45
Pressure, Bar (Pb) 30.09
Pressure, Static (Pstat)
Filters

Client/Plant/Location: OSW East
Probe 3-2 Cp Heat Set
Pitot Pretest in in/ml
Leak Check Post in in/ml
Nozzle 188
Sample Box Heat Set
Meter Box 6 dH@ Y
Meter Pretest cfm inH
Leak Check Post 0.004 cfm 7 inH
Moisture 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 (delP) (dPs)	Orifice Pressure (delH) in H2O	Stack Pressure (Ps)	STACK °F (Ts) Amb:	AFTER Inlet/Aux °F (Tm In) Amb:	AFTER Outlet °F (Tm out) Amb:	OVEN Filter °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		149	547.878											
1	5		549.990	.0007	.361	.37	158	74	70	250	256	50		6
1	10		552.072	.0006	.315	.37	158	74	70	249	252	46		6
2	15		554.	.0006		.32	158	74	70	249	252	49		6
2	20		555.780	.0005	.263	.26	158	74	70	249	252	49		6
3	25		557.82	.0007		.37	158	74	70	250	252	48		6
3	30		559.751	.0007		.37	158	74	70	251	252	48		6
4	35		561.6	.0006		.32	158	75	71	251	252	49		6
4	40		563.505	.0006		.32	159	75	71	251	252	49		6
5	45		565.20	.0006		.32	157	75	71	250	252	51		6
5	50		567.051	.0006		.32	157	75	71	251	252	51		6
6	55		568.9	.0006		.32	158	75	71	251	255	51		6
6	60	249	571.2	.0006		.32	158	75	71	251	255	51		6
6	65		572.780	.0006		.32	157	75	71	251	255	51		6
6	70		574.621	.0006		.32	158	75	71	251	255	51		6
5	75		576.375	.0006		.32	158	75	71	250	256	46		6
5	80		578.192	.0006		.32	159	75	71	250	256	46		6
4	85		580.	.0007		.37	159	75	72	251	255	46		6
4	90		582.310	.0007		.37	158	75	71	251	256	47		6
3	95		584.111	.0006		.32	157	75	71	251	256	48		6
3	100	329	585.894	.0007		.37	157	75	71	250	256	49		6

Notes:

SWA

Field Data Sheet

arizon ngineering

Client/Plant/Location: ODU west

Date 11-18-98

Test Method OOEQ 7

Concurrent Testing 2SA

Run # 11

Operator ARC Support CDB

Temperature, Amb (Ta) 43

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters

Probe 3-1 Cp .79 Heat Set 250

Pilot Pretest in in/n

Leak Check Post in in/n

Nozzle 988

Sample Box Heat Set

Meter Box 9 dH@ 1.8 Y .99

Meter Pretest 0.000 cfm 13 Int

Leak Check Post cfm Int

Moisture 20 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O dH@	Orifice Pressure inH2O Actual (dH)	STACK °F (Ts) Amb:	PROBE Inlet/Avg °F (Tm-In) Amb:	PROBE Outlet °F (Tm-out) Amb:	IMPINGER °F (Tp) Amb:	OVEN/Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	ABX °F (Ta)	Fan Vac inH (P
		352	905.980											
1	5		908.23	.0018	.534	.54	149	58	59	249	247	<68		3
1	10		910.14	.0011	592	.59	149	62	59	248	247	.		3
2	15		912.37	.0010		.54	150	75	60	249	249			3
2	20		914.18			.54	150	80	60	249	249			3
3	25		916.19			.54	150	80	60	249	249			3
3	30		918.471	.0009		.54	150	84	60	249	249	38		3
4	35		920.02	.0007	.377	.38	150	84	62	249	249	38		2
4	40		921.481	.0007		.32	150	84	62	249	249	38		2
5	45		923.111	.0007		.34	154	85	63	250	250	38		2
5	50		925.	.0007		.34	154	86	65	250	250	38		2
6	55		926.521	.0007		.34	154	87	66	250	250	38		2
6	60		928.115	.0004	22	.22	154	87	67	250	250	38		2
6	1:05		929.425	.0004	.22	.22	154	87	67	250	250	38		2
6	1:10		926.50	.0003	.166	.17	155	87	69	249	250	45		2
5	1:15		928.11	.0004		.22	155	87	69	249	250	45		2
5	1:20		931.021	.0003		.22	155	87	69	249	250	47		2
4	1:25		934.272	.0003		.22	156	87	69	249	250	47		2
4	1:30		935.	.0004		.20	156	87	69	249	246	47		
3	1:35		936.			.20	157	87	70	249	248	46		2
3	1:40		937.948	.0003		.15	157	87	70	250	249	46		2
2	1:45		938.935	.0002		.11	157	87	70	250	248	46		2
2	1:50		940.270	.0004		.22	157	87	70	251	248	46		2
1	55		941.52	.0004		.22	157	87	70	251	249	46		2
1	2:00	552	942.899	.0005		.29	157	87	70	251	249	46		2

Notes:

5WB

Field Data Sheet

Orion Engineering

Date 11-18-98

Test Method OQER 7

Concurrent Testing 251

Run # 11 cont

Operator DRB Support CDB

Temperature, Amb (Ta) 75

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters

Stack Diagram

Cyclonic Flow?

Client/Plant/Location: OSU West

Probe 3-1 Cp .79 Heat Set 250

Pitot Pretest in in/h

Leak Check Post 5 in 0.000 in/h

Nozzle .988

Sample Box Heat Set

Meter Box 9 dH@ 1.8 Y .99

Meter Pretest cfm in

Leak Check Post 0.000 cfm 6 in

Moisture 20 Tdb Twb

Traverse Point Number	Sampling Time min (Θ)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Orifice Meter (ΔH@) in/H2O (ΔH)	Orifice Pressure (ΔH) in/H2O DESIRED	Orifice Pressure (ΔH) in/H2O ACTUAL (ΔH)	STACK °F (Ts) Amb:	PROBE Inlet/Avg °F (Tm In)	PROBE Outlet °F (Tm out) Amb:	FILTER °F (Tp) Amb:	OVEN Filter °F (Ta) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vac in/Hg (Pv)
		605	942.999											
1	5		944.761	.0008	441	.44	157	82	72	246	249	45		4
1	10		946.01	.0008		.44	157	82	72	246	249	45		4
2	15		948.2	.0008		.44	157	85	72	251	249	46		4
2	20		950.0	.0008		.44	157	85	72	251	249	46		4
3	25		951.8	.0005		.38	158	90	71	251	249			4
3	30		953.1	.0007		.38	158	90	71	251	249			4
4	35		955.3	.0007		.38	158	90	71	251	249			4
4	40		957.211	.0005		.38	158	91	71	251	249			4
5	45		958.975	.0005		.38	158	91	71	251	249			4
5	50		960.751	.0003	.167	.17	158	89	73	252	249			2
6	55		961.51	.0005	.279	.28	158	89	73	252	249			3
6	60	705	963.075	.0005		.28	158	89	73	252	249			3
6	05		964.525	.0005		.28	158	89	73	252	249			3
6	10		966.125	.0006	.334	.33	158	89	73	252	249	50		3
5	15		967.685	.0006	.334	.33	158	89	73	252	249	50		3
5	20		969.101	.0005		.28	157	89	73	252	248	50		3
4	25		970.522	.0005		.28	158	89	73	252	249	50		3
4	30	735	972.202	.0007		.38	158	89	73	252	249	52		3

Notes:

Field Data Sheet

Horizon Engineering

6

Date	11-18-99
Test Method	00EQ 7
Concurrent Testing	25A
Run #	12
Operator	OEC Support CDB
Temperature, Am (Ta)	48
Pressure, Bar (Pb)	30.08
Pressure, Static (Pstat)	0
Filters	

Client/Plant/Location:	OSU East
Probe	3-2 Cp .805 Heat Set 250
Pitot Leak Check	Pretest 3 in 0 in/in; Post in in/in
Nozzle	.988
Sample Box	Heat Set 250
Meter Box	6 dH@ 1.69025 Y .99
Meter Leak Check	Pretest 0.006 cfm 13 inHg; Post cfm inHg
Moisture	20 Tdb Twb

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 (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)
		758	586.712											
1	5		587.925	0.0002	.104	.10	149	59	58	249	255	43		4
1	10		589.111	0.0002		.10	149	59	58	249	256	43		4
2	15		590.375	.0003	.156	.16	153	59	58	250	255	44		4
2	20		592.11	.0004	.209	.21	153	60	58	250	255	43		4
3	25		592.85	.0002	.104	.10	153	61	58	249	255	40		4
3	30			.0002	.104	.10	153	61	59	250	252	41		4
4	35			.0002	.104	.10								4
4	40			.0002	.104	.10								4
5	45		598.25	.0002	.104	.10								4
5	50		599.19	.0002	.104	.10	160	65	61	249	255	47		4
6	55		600.47	.0002	.104	.10	160	65	61	251	256	47		4
6	60	858	601.725	.0002	.104	.10	159	66	61	249	257	47		4
1	5		—.—	.0004	.209	.21	160	66	63	251	253	49		5
1	10		605.04	.0004	.209	.21	160	68	63	250	255	48		5
2	15		606.10	.0002	.104	.10	160	68	64	250	255	47		4
2	20		607.64	.0003	.156	.16	160	69	65	251	256	49		5
3	25		609.49	.0004	.209	.21	160	69	66	251	258	49		5
3	30		611.32	.0002	.104	.10	160	71	66	249	255	49		5
4	35		612.81	.0003	.156	.16	160	73	68	248	249	50		5
4	40		613.97	.0002	.104	.10	160	74	68	249	252	51		5
5	45		615.14	.0002	.104	.10	160	74	69	249	254	51		5
5	50		617.01	.0004	.209	.21	161	74	69	251	252	53		5
6	55		618.65	.0003	.156	.16	161	74	70	249	252	54		5
6	60	958	620.414	.0002	.104	.10	160	75	71	250	252	57		5

Notes:

Field Data Sheet

b

Client/Plant/Location: OSV East

Date 11/18/98

Test Method OOEQ7

Concurrent Testing 25A

Run # 12

Operator CDB Support DKB

Temperature, Amb (Ta) 55

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat) 0

Probe 3-2 Cp .805 Heat Set 250

Pilot Pretest 3 in 0 lb/mi

Leak Check Post in lb/m

Nozzle .988

Sample Box Heat Set 250

Meter Box 6 dH@ 1.69025 Y .99

Meter Pretest .006 cfm 15 InH

Leak Check Post .008 cfm 6 InH

Moisture 20 Tdb Twb

Filters

Stack Diagram

Cyclonic Flow?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH)	Orifice Pressure inH2O Actual (dH)	STACK °F (Ts) Amb:	METER Inlet/Avg °F (Tm in)	METER Outlet °F (Tm out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Fan Vacuum inHg (Pv)
		1006	620.414											
1	5		— —	.0002	.1044	.10	153	75	73	252	251	58		5
1	10	16	623.65	.0002	.1044	.10	161	77	74	251	252	52		5
2	15		624.85	.0002	.104	.10	162	78	75	251	251	51		5
2	20	26	626.47	.0002	.104	.10	162	79	74	251	250	51		5
3	25		627.69	.0002	.104	.10	162	80	77	250	251	51		5
3	30	36	629.10	.0002	.104	.10	162	80	77	250	252	52		5
4	35		630.12	.0001	.0522	.05	162	80	77	250	251	52		4
4	40	46	631.10	.0001	.0522	.05	162	80	77	250	253	54		5
5	45		632.00	.0001	.0522	.05	162	80	77	251	253	56		5
5	50	56	632.94	.0001	.0522	.05	162	81	78	251	257	53		5
6	55		633.86	.0001	.0521	.05	162	81	78	251	253	52		4
6	60	1006	— —	.0001	.0522	.05	162	81	80	251	254	53		4
1	5		635.73	.0001	.0522	.05	158	83	80	251	254	54		4
1	10	16	636.66	.0001	.0527	.05	161	83	81	251	254	55		4
2	15		637.58	.0001	.0522	.05	162	83	81	251	255	55		4
2	20	26	638.49	.0001	.0522	.05	161	83	81	251	253	54		4
3	25		639.50	.0001	.0522	.05	155	83	81	251	250	54		4
3	30	36	640.31	.0001	.0522	.05	156	83	81	252	253	55		4
4	35		641.27	.0001	.0522	.05	161	83	81	251	249	54		4
4	40	46	642.55	.0001	.0522	.05	162	83	82	251	250	54		5
5	44	51	643.566	.0001	.0522	.05	162	83	81	251	252	55		5
5			stopped	at	64 min									
6														
6														

West Port

West Port

Notes:

Damper switch @ 11:51

6WA

Field Data Sheet

onion engineering

Date 11/18/98
Test Method OOEQ 7
Concurrent Testing 25A
Run # 13
Operator CDB Support DRB
Temperature, Amb (Ta) 55
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU West

Probe 3-1 Cp .79 Heat Set 250
Pitot Pretest 5 in 0 in/mi
Leak Check Post in in/mi
Nozzle .988
Sample Box Heat Set 250
Meter Box 9 dH@ 1.82334 Y .99062
Meter Pretest .008 cfm 15 inHg
Leak Check Post cfm inHg

Filters

Stack Diagram

Cyclonic Flow?

Moisture 30

Traverse Point Number	Sampling Time min (θ)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (ΔPv) in H2O	Orifice Pressure (ΔH) in H2O	Orifice Pressure (ΔH) in H2O	STACK Temp °F (Ts)	AFTER Inlet/Avg °F (Tm in)	AFTER Outlet °F (Tm out)	Tdb PROBE °F (Tp)	Tdb OVEN Filter °F (To)	Twb IMPINGER Outlet °F (Ti)	AUX °F (Ta)	Temp Vacuum inHg (Pv)
		1203	972.569				Amb:			Amb:	Amb:	Amb:		
1	5		.	.0013	.5744	.57	162	66	67	245	190	<68		3
1	10		.	.0013	.5744	.57								3
2	15		.	.0013	.5744	.57								3
2	20		980.59	.0013	.5744	.57								3
3	25		982.60	.0013	.5744	.57	172	83	66	230	283			3
3	30		984.45	.0011	.4860	.49	172	83	66	233	282			3
4	35		—.—	.0011	.4860	.49	171	85	67	231	283			3
4	40		988.36	.0013	.5744	.57	172	86	67	230	282			4
5	45		990.35	.0013	.5744	.57	173	88	68	228	282			4
5	50		992.26	.0011	.4860	.49	173	88	69	233	282			4
6	55		994.16	.0010	.4418	.44	173	88	69	230	282			4
6	60		996.27	.0013	.5744	.57	172	89	69	232	282			5
1	5		998.17	.0011	.4860	.49	172	90	70	230	282			4
1	10		1000.02	.0010	.4418	.44	172	90	70	232	282			4
2	15		1002.99	.0011	.4860	.49	173	90	70	233	282			4
2	20		1003.95	.0011	.4860	.49	172	90	71	231	282			4
3	25		1005.91	.0012	.5302	.53	173	86	72	229	283			4
3	30		1008.36	.0013	.5744	.57	173	88	72	238	282			4
4	35		1010.01	.0012	.5302	.53	173	90	72	236	282			5
4	40		1011.57	.0008	.3534	.35	173	91	72	234	282			4
5	45		1013.14	.0011	.4860	.49	173	90	72	235	282			4
5	50		1014.99	.0008	.3534	.35	173	90	72	234	281			4
6	55		1016.43	.0011	.4860	.49	173	91	72	235	281			4
6	60	1405	1018.038	.0011	.4860	.49	173	91	72	235	281			4

Notes: 1321 Lost Power
1323 Regain Power + Resume testing

6WB

Field Data Sheet

[redacted] ortech [redacted] ngineering

Client/Plant/Location: OSU West

Date 11/18/98

Test Method 26EQ 7

Concurrent Testing 25A

Run # 13

Operator CDB Support DRB

Temperature, Amb (Ta) 55

Pressure, Bar (Pb) 30.44

Pressure, Static (Pstat) 0

Probe 3-1 Cp .79 Heat Set 250

Pitot Pretest in in/min

Leak Check Post in in/min

Nozzle .988

Sample Box Heat Set 250

Meter Box 9 dH@ 1.82354 Y .99062

Meter Pretest cfm Init

Leak Check Post .01 cfm 6 Init

Filters Cyclonic Flow ? Stack Diagram

Moisture 30 Tdb Twb

Traverse Point Number	Sampling Time (dt)	Clock Time (Military)	Dry Gas Meter Reading (Vm)	Velocity Head (inH2O)	Orifice Pressure (inH2O) DESIRED	Orifice Pressure (inH2O) ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
			1018.038									
1	5		— . —	.0003	.1325	.13	171	81	74	237	250	68		3
1	10		~~204.43~~	.0003	.1325	.13	172	81	74	238	251			3
2	15		1021.755	.0003	.1325	.13	173	81	74	237	242			3
2	20	1449	1022.69	.0003	.1325	.13	173	81	74	237	240			3
3	25		1023.69	.0005	.2209	.22	163	74	73	237	281			3
3	30		1024.65	.0001	.0442	.04	171	78	72	236	281			3
4	35		1025.72	.0003	.1325	.13	173	81	72	237	281			3
4	40		1026.65	.0003	.1325	.13	173	84	72	236	280			3
5	45		1027.60	.0003	.1325	.13	174	85	72	236	282			3
5	50		1028.42	.0003	.1325	.13	174	84	73	233	281			3
6	55		1029.43	.0002	.0884	.09	174	85	73	237	282			3
6	60		1030.24	.0002	.0884	.09	174	84	74	232	282			3
1	5		1031.07	.0003	.1325	.13	173	84	73	238	244			3
1	10		1032.39	.0005	.2209	.22	175	79	74	236	244			3
2	15		1033.62	.0004	.1767	.18	175	81	77	240	245			3
2	20		1034.86	.0004	.1767	.18	175	82	73	240	244			3
3	25		1036.05	.0003	.1325	.13	174	83	72	244	240			3
3	30		1036.263	.00498	2.2	2.2	194	84	72	239	244			5
4	35													
4	40		Stopped @ 1606											
5	45													
5	50													
6	55													
6	60													

East Port

East Port

Notes: 1425 Stopped Train for Moisture check
1449 Resume Testing
Stopped @ 1541 circuit breaker Resume @ 1546

Field Data Sheet

[redacted] rizon [redacted] ngineering

Client/Plant/Location: WSU west

Date 11-18-98

Test Method OOEQ 7

Concurrent Testing 25A

Run # 1 cycle 2

Operator DRD Support CDB

Temperature, Am (Ta) 50

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters 98m 95-

Probe 3-1 Cp .79 Heat Set 250

Pilot Pretest in in/n

Leak Check Post in in/n

Nozzle 610 = .3788 / .988

Sample Box Heat Set

Meter Box 9 dH@ 1.8 Y .99

Meter Pretest 0.000 cfm 15 inl

Leak Check Post 0.002 cfm 7 inl

Moisture 15 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 (dP)	Orifice Pressure (dH)	Stack Pressure (Ps)	STACK °F (Ts)	IMPR IN Inlet/Avg °F (Tm In)	IMPR OUT Outlet °F (Tm out)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	AUX °F (Ta)	Fan Vac in (P
		2040	036.960				Amb:				Amb:			
1	5		39050	0.0411	.55	.55	90	45	45	238	244	<68		5
1	10			.04		.56	87	47	47	238	245	35		5
2	15		43.411	.01	.141	.14	85	50	47	238	244	37		1
2	20		44.351	.01		.14	86	50	47	240	244	37		1
3	25		45.010	.0040	.056	.06	86	51	47	244	242	37		1
3	30	2110	45.444	.0020	.028	.03	87	52	48	242	244	37		1
4	35	2125 2130	47.321	.0007	.459	.46	92	52	50	242	244	38		4
4	40		49.75	.0013	.852	.85	94	52	51	244	244	38		5½
5	45		52.	.0011	.713	.71	97	54	51	239	245	39		6
5	50		54.	.0013		.74	100	57	52	239	244	41		5
6	55		56.624	.0011		.74	103	59	52	239	244	41		5
6	60		59.130	.0013	.837	.84	105	60	52	240	245	41		5½
6	1:05	2200	61.59	.0012	.770	.77	107	61	53	240	245	41		5
6	1:10		63.4	.0013		.78	110	62	54	241	245	42		5
5	1:15	2210	66.360	.0012		.78	112	63	54	241	245	42		5
5	1:20	2215	68.800	.0013		.78	114	64	54	241	245	42		5
4	1:25	2220												
4	1:30													
3	1:35	2230												
3														
2														
2														
1														
1														

Notes: * Changed nozzles @ 2110 From .3788" to .988"

Cycle 2 started @ 825 pm 11/18/98

Field Data Sheet

Arizon **ngineering**

Client/Plant/Location: OSU East

Date 11-18-98

Test Method 5 00EQ7

Concurrent Testing 25A

Run # 2 cycle 2

Operator ARB Support CDJ

Temperature, Am (Ta) 42

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters 98-176 985-

Probe 3-2 Cp .845 Heat Set 250

Pitot Pretest in in/mi

Leak Check Post in in/mi

Nozzle 0.988 "

Sample Box Heat Set

Meter Box 6 dH@ 1.69 Y .99

Meter Pretest 0.005 cfm 13 inHg

Leak Check Post cfm 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) Avdc	PROBE °F Inlet/Avg Exit (Tm in) Avdc	METER °F Outlet (Tm out) Avdc	FILTER °F (Tf) Avdc	OVEN °F (To) Avdc	IMPINGER Outlet °F (Ti) Avdc	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		2235	643.955											
1	5		645.021	.0003	.088	.09	127	51	48	251	256	38		4
1	10		646.3	.0003		.09	129	51	49	251	255	38		4
2	15		647.53	.0004		.09	134	52	50	251	256	38		4
2	20		648.802	.0004		.09	135	53	51	251	255	39		4
3	25		650.	.0005	.139	.14	138	54	51	251	255	39		4½
3	30		651.			.13		55	52	251	255	43		5
4	35		653.			.13		56	53	252	255	43		5
4	40		654.00	.0005		.13		58	54	250	255	43		5
5	45		655.93	.0005	.136	.14	148	58	54	250	255	43		5
5	50		657.898	.0004	.25	.32	150	58	54	249	253	42		5
6	55		659.999	.0003		.32	153	60	55	250	258	41		5
6	60		661.65	.0004		.32	154	61	56	250	256	42		5
6	65		662.85	.0004		.20	156	61	56	249	256	42		5
6	70		663.21	.0003	.12	.18	160	61	56	250	252	41		5
5	75		665.68	.0005		.18	164	61	56	250	252	41		5
5	80		666.	.0003	.12	.18	164	61	57	250	252	41		5
4	85		668.12	.0003		.17	168	61	58	250	254	42		5
4	90		669.375	.0005		.20	171	61	58	250	254	42		5
3	95		870.770	.0004		.18	171	61	58	250	254	42		5
3	100		873.333	.0016	.652	.65	173	61	58	250	254	43		7
2	105		875.	.0012	.484	.49	176	63	59	250	255	44		7
2	110		~~880.2~~	.0014		.49	177	64	60	248	255	45		7
1	115		878.	.0006		.49	177	64	60	248	254	45		7
1	120		881.190	.0007		.45	180	64	60	248	254	45		7

Notes:

Field Data Sheet

[redacted] onizon [redacted] ngineering

Client/Plant/Location: OSU East

Date 11-19-18

Test Method 0060.7

Concurrent Testing 25A

Run # 2 cont Cyc 2

Operator DRB Support CDB

Temperature, Amb (Ta) 78

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Probe 3-2 Cp Heat Set

Pilot Pretest in lv/m

Leak Check Post 4(in 0.00 lv/m

Nozzle .788

Sample Box Heat Set

Meter Box 6 dH@ Y

Meter Pretest cfm Int

Leak Check Post 0.002 cfm 7½ Int

Filters

Cyclonic Flow ?

Stack Diagram

Moisture Tdb Twb

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 Drop in H2O (ΔH)	Orifice Pressure Drop in H2O Actual (ΔH)	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 (Ta)	Pump Vacuum in Hg (Ps)
		043	681.190											
1	5		684.810	.0010		.26	181	62	60	246	~~246~~ 253	~~253~~ 44		.6
1	10		686.05	.0010	.322	.32	181	62	60	249	252	46		6
2	15		687.32	.0008		.26	181	61	60	248	251	50		6
2	20		688.5	.0008		.26	181	61	60	248	249	49		6
3	25		689.7			.24	180	61	56	249	250	50		6
3	30		691.200	.0006		.24	180	61	59	250	250	51		6
4	35		692.	.0008		.26	180	61	59	250	250	51		6
4	40		694.	.0007		.25	181	62	60	250	255	55		6
5	45		695.999	.0009		.25	181	62	60	250	255	57		6
5	50		697.2	.0007		.25	181	63	60	250	255	55		6
6	55		698.5	.0007	.226	.23	181	63	60	250	251	54		6
6	60	143	700.825	.0007		.23	181	63	60	250	251	56		6
6	65		702.42	.0007		.23	181	63	60	250	251	56		6
6	70		704.05	.0009		.23	181	63	60	250	251	56		6
5	75		705.61	.0007		.17	181	63	60	251	252	58		6
5	80		707.205	.0008		.23	181	63	60	251	253	59		6
4	85		708.78	.0008		.23	181	63	60	251	251	59		6
4	90	213	710.212	.0008		.23	181	63	60	250	251	59		6

Notes:

Field Data Sheet

[redacted] arizon [redacted] ngineering

Client/Plant/Location: OSU West

Date 11-19-98

Test Method OQEQ7

Concurrent Testing 25A

Run # 3 cy 2

Operator ORG Support COD

Temperature, Amb (Ta) 35

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters

Probe B-1 Cp .7901 Heat Set 350

Pilot Pretest in in/inH2O

Leak Check Post in in/inH2O

Nozzle .488

Sample Box Heat Set 260

Meter Box 9 dH@ 1.82334 Y 0.9906

Meter Pretest 0.005 cfm 10 inHg

Leak Check Post cfm inHg

Moisture 40 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE °F Inlet/Avg (Tn/Ts) Amb:	METER °F Outlet (Tm out) Amb:	FRONT °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		231	69.245											
1	5		71.695	.0026	.825	.83	178	47	47	235	244	34		6
1	10		74.175	.0027		.84	178	47	47	232	244	3.5		6
2	15		76.660	.0026		.84	179	50	48	233	245	43		6
2	20		79.122	.0028		.84	179	51	48	233	245	43		6
3	25		80.51	.0027		.84	179	51	48	233	245	43		6
3	30		81.9	.0008		.19	178	51	49	243	245	50		6
4	35		83.3			.19	178	53	50	243	245	50		6
4	40		84.7			.19	178	55	50	243	245	55		6
5	45		86.2	.0008		.19	178	57	50	243	245	57		6
5	50		87.4	.0008		.19	178	61	51	243	245	57		6
6	55		88.810	.0007		.19	178	61	51	243	245	57		6
6	60		90.120	.0007		.22	178	61	51	444	244	54		6
6	1:05		91.5	.0009	.284	.28	178	62	52	244	244	52		6
6	1:10		92.9	.0005		.26	178	64	52	244	244	52		5
5	1:15		94.3	.0006		.26	178	64	52	244	244	52		5
5	1:20		95.7	.0011		.26	178	64	54	244	244	52		5
4	1:25		97.1	.0008		.26	178	65	55	244	244	52		5
4	1:30		98.9	.0007		.26	178	66	56	244	244	52		5
3	1:35		100.364	.0007		.26	178	66	56	244	244	52		5
3	1:40		101.83	.0007	.22	.22	178	66	56	244	244	52		6
2	1:45		103.21	.0006		.21	178	67	57	244	245	53		5
2	1:50		104.29	.0006		.21	178	67	58	243	245	55		5
1	1:55		105.475	.0005		.20	178	67	58	243	245	60		5
1	2:00	431	106.663	.0008		.20	178	67	59	243	245	62		5

Notes:

Field Data Sheet

[redacted] arian [redacted] ngineering

Date 11-19-98

Test Method OREQ 7

Concurrent Testing 25A

Run # 3 cont

Operator DRB Support CDD

Temperature, Amb (Ta) 40

Pressure, Bar (Pb) 30.08

Pressure, Static (Pstat)

Filters

Client/Plant/Location: ODU West

Probe 3 — Cp

Pilot	Pretest	in	Heat Set in/mi
Leak Check	Post	in	in/m

Nozzle .988

Sample Box

Meter Box 9 dH@ Heat Set Y

Meter	Pretest	cfm	Inl
Leak Check	Post 0.004	cfm 8	Inl

Stack Diagram

Cyclonic Flow ?

Moisture

Traverse Point Number	Sampling Time (min)	Clock Time (Hr:Min)	Dry Gas Meter Reading (Vm)	Velocity Head (delH) ("H2O)	Orifice Pressure (delH) ("H2O)	Stack Pressure (delH) ("H2O)	STACK Ts (°F)	SCRUB Inlet/Avg (Tm in) (°F)	SCRUB Outlet (Tm out) (°F)	Tdb PROBE Tp (°F)	Tdb OVEN Filter To (°F)	Twb IMPINGER Outlet Tf (°F)	AUX (°F)	Pump Vacuum (in Hg) (Pv)
		441	106.663			.35	Amb:		Amb:	Amb:		Amb:		
1	5		108.223	.0011	3545	.38	177	63	60	245	245	55		3
1	10		109.73	.0010	.320	.32	177	64	61	244	245	55		3
2	15		111.21			.31	177	64	61	244	245	55		3
2	20		112.89			.31	176	64	61	244	245	55		3
3	25		114.515	.0010		.31	176	64	61	244	245	48		3
3	30		116.000	.0009		.29	176	64	61	244	245	44		3
4	35		118.481			.29	176	65	61	245	244	47		3
4	40		119.921			.30	176	65	61	245	244	47		3
5	45		121.375			.31	176	65	61	245	244	50		3
5	50		122.82	.0007		.28	176	65	61	245	244	50		3
6	55		124.	.0007		.28	176	65	61	245	244	50		3
6	60		125.	.0007		.29	176	66	61	245	244	51		3
6	1:05		127.211	.0007		.29	174	67	61	245	242	51		3
6	1:10		128.7			.29	174	67	61	245	242	53		3
5	1:15					.29	174	68	61	245	242	53		3
5	1:20	605	130.875	.0004		.29	174	69	61	245	242	53		3
4	1:25	610	132.251	.0009		.31	174	69	61	245	242	53		3
4	1:30	615	133.802	.0008		.31	174	69	62	245	242	54		3

Notes:

Field Data Sheet

Arizon / ngineering

Date 11/19/98
Test Method 0OEQ7
Concurrent Testing 23A
Run # 4 Cycle 2
Operator CPB Support DKB
Temperature, Am (Ta) 50
Pressure, Bar (Pb) 30.08
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU East
Probe 3-2 Cp .80537 Heat Set 250
Pilot Pretest in in/mi
Leak Check Post 5 in 0 in/mi
Nozzle .988
Sample Box Heat Set 250
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest cfm in H
Leak Check Post .005 cfm 11 in H
Moisture 30 Tdb Twb

Filters

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (Θ)	Clock Time (24 hr)	Dry Gas Meter Reading -ed (Vm)	Velocity Head inH2O (ΔPs)	Orifice Pressure inH2O ΔH@	Orifice Pressure inH2O ΔH (ΔH)	STACK °F (Ts) Amb:	Air Sph °F Inlet/Avg (Tm In/Avg) Amb:	Meter °F Outlet (Tm out) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Ps)
		846	752.218											
1	5		753.81	.0003	.1214	.12	166	69	67	284	261	47		6
1	10		756.11	.0012	.4856	.49	167	69	67	278	261	45		7
2	15		757.58	.0006	.2428	.24	162	69	67	281	263	47		5
2	20		758.90	.0004	.1619	.16	152	69	67	281	261	48		5
3	25		761.19	.0011	.4452	.45	166	69	67	270	261	48		7
3	30		763.25	.0010	.4047	.40	167	70	66	281	263	47		7
4	35		765.30	.0010	.4047	.40	168	70	67	281	262	48		6
4	40		768.68	.0033	1.3355	1.3	169	71	66	281	263	49		9
5	45		771.01	.0013	.5261	.53	168	71	67	276	266	51		7
5	50		774.56	.0039	1.5783	1.6	170	72	68	280	263	51		10
6	55		777.09	.0017	.6880	.69	170	72	67	276	266	55		7
6	60		779.37	.0013	.5261	.53	170	72	67	280	265	52		6
6	5		781.36	.0011	.4452	.45	170	72	67	282	263	50		6
6	10		783.89	.0015	.6070	.61	170	72	67	281	263	50		7
5	15		786.45	.0014	.5666	.57	170	72	68	281	263	52		7
5	20		789.00	.0016	.6475	.65	171	76	68	279	263	50		7
4	25		791.55	.0016	.6475	.65	170	72	68	279	266	49		7
4	30		794.08	.0016	.6475	.65	170	72	68	280	266	50		7
3	35		796.14	.0012	.4856	.49	169	72	68	279	267	51		6
3	40		797.49	.0004	.1619	.16	166	72	68	279	264	51		5
2	45	1031	798.830	.0004	.1619	.16	165	71	68	281	263	50		5
2	50			.0006	.2428	.24								
1	55		Stopped @		10:31									
1	60													

South Port

South Port

Notes: Damper switch @ 10:31

Field Data Sheet

Date	11-14-98
Test Method	ODEQ 7
Concurrent Testing	25A
Run #	4 (Cyc 2)
Operator	SRS Support CDB
Temperature, Amb (Ta)	40
Pressure, Bar (Pb)	30.08
Pressure, Static (Pstat)	

Client/Plant/Location: ODOT East

Probe 3-2 Cp Heat Set 250

Pitot Pretest 4 in 0.0 in/m

Leak Check Post in in/m

Nozzle .988

Sample Box Heat Set 250

Meter Box 6 dH@ 1.69 Y .99

Meter Pretest 0.003 cfm 10 inl

Leak Check Post cfm inl

Moisture 30

Filters

Cyclonic Flow ?

Stack Diagram

Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Differential Pressure inHg (dH) DESIRED	Differential Pressure inHg (dH) ACTUAL	STACK °F (Ts) Avg:	AFTER Inlet/Avg °F (Tm in) Avg:	AFTER Outlet °F (Tm out) Avg:	PROBE °F (Tp) Avg:	OVEN/Filter °F (To) Avg:	IMPINGER Outlet °F (Ti) Avg:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		633 ~~633~~	710.377											
1	5		711.711	.0006	.211	.21	172	54	53	250	256	44		9
1	10		713.017	.0004	.142	.14	172	54	53	248	251	45		8
2	15		714.821	.0006		.21	172	55	53	249	254	46		8
2	20		716.111	.0006		.21	173	56	55	260	260	47		8
3	25		717.555	.0006		.21	173	57	55	260	260	47		8
3	30		719.240	.0006		.21	173	58	55	260	260	47		9
4	35		721.95	.0006		.20	171	59	55	260	262	46		9
4	40		723.62	.0006		.25	171	60	56	260	262	46		9
5	45		725.1	.0006		.25	171	62	57	260	262	45		9
5	50		726.385	.0007		.25	171	63	58	260	261	45		9
6	55		727.980	.0006	.21	.21	171	64	59	261	263	46		7
6	60	733	729.835	.0008	.284	.28	171	65	60	260	265	47		8
6	65		731.755	.0007	.2896	.28	170	65	60	267	262	49		8
6	70		733.702	.0008	.323	.32	170	66	60	265	265	50		9
5	75		735.511	.0007	.28	.28	170	67	61	266	267	50		8
5	80		737.521	.0008		.32	170	68	63	~~166~~ 266	~~266~~ 265	50		8
4	85		739.38	.0007		.28	170	68	63	200	265	51		7½
4	90		741.03	.0007	.2833	.28	170	69	63	283	264	51		8
3	95		742.86	.0007	.2833	.28	170	69	64	282	264	51		8
3	100		744.99	.0006	.21	.21	171	71	65	282	266	52		8
2	105		746.58	.0006	.21	.21	171	71	66	282	264	52		8
2	110		748.23	.0006	.21	.21	171	71	66	282	264	51		8
1	115		750.20	.0008	.284	.28	171	71	67	282	263	50		8
1	120	833	752.218	.0007	.2833	.28	171	72	67	281	263	51		8

West Port

West Port

Notes:

Field Data Sheet

Arizon / ngineering

Date 11/19/98
Test Method OOEQ.7
Concurrent Testing 25A
Run # 5
Operator CAB Support DAS
Temperature, Amb (Ta) 55
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU West
Probe 3-1 Cp .79 Heat Set 250
Pilot Pretest 5 in 0 ln/m
Leak Check Post in ln/m
Nozzle .988 .5807 .4910, .5802 .9880
Sample Box Heat Set 250
Meter Box 9 dH@ 1.82 334 Y .9906C
Meter Pretest 0 cfm 15 lnH
Leak Check Post cfm lnH
Moisture 30 Tdb Twb

Stack Diagram

Filters

Cyclonic Flow ?

Traverse Point Number	Sampling Time (min)	Clock Time (Hrs)	Dry Gas Meter Reading (Vm)	Velocity Head (dPv)	Orifice Pressure (dH) ACTUAL	Orifice Pressure (dH) DESIRED	STACK T (Ts)	AFTER Int/Aug T (Tm In)	AFTER Outlet T (Tm out)	OVEN Filter T (Tp)	OVEN IMPINGER Outlet T (Ti)	AUX T (Ta)	Pump Vacuum (Pv)
							Amb:	Amb:	Amb:	Amb:	Amb:		
South Port 1	5		135.45	.0039	.0998	.10	159	56	55	237	266	49	1
1	10		136.41	.0042	.1074	.11	160	56	55	244	280	51	1
2	15			.0037	.0947	.09	160	57	55	242	279	52	1
2	20												
3	25				Calibrating Jump								
3	30		140.37										
4	35		141.29	.0043	.1100	.11	158	63	57	242	281	48	1
4	40		142.62	.0007	.2943	.27	157	63	59	245	281	48	3
5	45		144.06	.0017	.7147	.71	157	65	59	241	281	45	3
5	50		146.22	.0015	.6306	.63	157	66	60	242	281	45	5
6	55		148.38	.0007	.2943	.29	159	68	60	242	281	46	4
6	60		151.28	.0028	1.1722	1.2	164	70	61	240	282	48	8
6	65		154.82	.0031	1.3038	1.3	165	70	62	240	281	50	8
6	70		157.82	.0030	1.2613	1.3	166	69	63	227	263	50	8
5	75		160.50	.0023	.9670	.97	165	69	63	227	263	52	7
5	80		161.82	.0006	.2523	.25	163	70	63	228	263	51	2
4	85		163.75	.0010	.4625	.46	163	70	63	229	263	50	4
4	90		165.04	.0005	.2102	.21	165	72	63	229	263	49	2
3	95		166.94	.0012	.5045	.50	164	71	64	230	263	48	4
3	100		169.64	.0023	.9670	.97	163	73	64	228	263	48	4
2	105		172.34	.0023	.9670	.97	163	73	64	228	263	48	6
2	110		175.18	.0026	1.0931	1.1	159	74	65	228	263	50	8
1	115		177.94	.0023	.9670	.97	157	73	65	227	263	51	6
1	120	1254	180.926	.0032	1.3454	1.3	157	73	65	224	263	50	8

Notes: Change Nozzles @ 1124 Change from .4910 to .9880
Restart @ 1127

Field Data Sheet

Arizon ngineering

Date 11/19/98
Test Method OOEQ 7
Concurrent Testing 25A
Run # 5
Operator COB Support DKB
Temperature, Amb (Ta) 55
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU West
Probe 3-1 Cp .79 Heat Set 250
Pitot Pretest 5 in 0 in/m
Leak Check Post in in/m
Nozzle .9880
Sample Box Heat Set 250
Meter Box 9 dH@ 1.82354 Y .9906
Meter Pretest 0 cfm 15 inH
Leak Check Post 0 cfm 10 inH

Stack Diagram

Filters

Cyclonic Flow ?

Moisture Tdb Twb

Traverse Point Number	Sampling Time min (Θ)	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) Avg:	AFTER Inlet/Avg °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)	Pitot Vacuum inH (Ps)
		1304	181.146											
1	5		183.25	.0014	.5886	.59	150	69	66	229	263	47		4
1	10		185.37	.0014	.5886	.59	151	69	66	229	263	47		4
2	15		187.95	.0023	.9670	.97	149	70	66	227	263	48		6
2	20		190.57	.0014	.5886	.59	149	71	66	227	263	50		6
3	25		192.95	.0019	.7988	.80	150	71	66	224	263	51		6
3	30		196.07	.0035	1.4715	1.5	151	72	66	226	263	55		8
4	35		197.96	.0010	.4204	.42	152	72	66	222	262	57		4
4	40		——.—	.0012	.5045	.50	153	72	66	227	263	57		4
5	45		201.90	.0038	1.5976	1.6	162	74	67	227	263	52		8
5	50		204.27	.0015	.6306	.63	158	74	67	227	263	52		5
6	55		206.42	.0017	.7147	.71	161	75	67	227	262	51		5
6	60		209.44	.0036	1.5136	1.5	161	75	67	227	263	51		8
6	65		213.05	.0039	1.6397	1.6	163	75	67	226	263	51		8
6	70		215.81	.0035	1.4912	1.5	161	74	67	225	262	51		8
5	75		218.55	.0023	.9799	.98	162	73	68	225	263	50		6
5	80		220.90	.0018	.7669	.77	163	73	68	226	262	49		5
4	89		223.24	.0017	.7243	.72	163	73	68	226	262	49		5
4	90	1432	224.312	.0010	.4261	.43	163	74	68	226	262	49		
3	95													
3	100													
2	105													
2	110													
1	115													
1	120													

Notes: Leak checked at Post change
Before and after H_2O dump .0001S @ 10 in H_2O
Damper switch @ 1432

Field Data Sheet

[redacted] orizon [redacted] ngineering

Date 11/9/98
Test Method OQEQ 7
Concurrent Testing 25A
Run # 6
Operator CDB Support DKB
Temperature, Amb (Ta) 55
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU East
Probe S-7 Cp .805337 Heat Set
Pilot Pretest 5 in 0 lb/in
Leak Check Post in lb/in
Nozzle S B02 .988, ~~.990~~
Sample Box Heat Set
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest 0 cfm 15 lb/
Leak Check Post cfm lb/

Filters
Stack Diagram
Cyclonic Flow ?
Moisture 25 Tdb Twb

Traverse Point Number	Sampling Time min (Θ)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (ΔPs)	Orifice Pressure inH2O DESIRED	Orifice Pressure inH2O ACTUAL (ΔH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		1451	799.856									
~~South~~ ~~Lost~~ Out 1	5		804.06	.0029	1.3378	1.3	150	62	62	281	261	49		9
1	10		807.34	.0017	.7842	.78	150	64	63	281	266	50		6
2	15		809.29	.0017	.7842	.78	145	66	63	281	265	55		6
2	20		812.48	.0013	.5997	.60	133	67	63	281	265	60		6
3	25			.0013	.5997	.60	131	68	63	282	266	61		6
3	30		Calculating Time											
4	35													
4	40		821.99											
5	45		823.57	.0006	.2768	.28	136	71	65	272	264	67		5
5	50		827.92	.0055	2.5373	2.5	150	71	65	275	264	63		15
6	55		829.73	.0005	.2307	.23	132	73	66	273	265	61		5
6	60		831.37	.0005	.2307	.23	131	72	66	282	267	54		5
6	65		835.82	.0052	2.3989	2.4	146	72	66	276	268	52		14
South 6	70		837.46	.0004	.1845	.18	133	74	67	274	267	55		5
~~East~~ 5	75		840.38	.0021	.9688	.97	150	72	66	282	264	54		9
5	80		— . —	.0008	.3691	.37	152	73	68	279	263	54		6
4	85		844.30	.0008	.3691	.37	155	72	67	280	263	55		6
4	90		846.23	.0008	.3691	.37	156	72	67	281	263	57		6
3	95		848.17	.0008	.3691	.37	160	72	67	282	263	58		6
3	100		850.48	.0012	.5536	.55	163	72	68	280	264	60		7
2	105		852.11	.0006	.2768	.28	160	72	68	281	266	61		6
2	110		854.72	.0015	.6920	.69	164	71	68	282	263	51		7
1	115		856.48	.0007	.3229	.32	161	72	68	281	264	51		6
1	120	1651	858.614	.0009	.4152	.42	162	72	68	281	266	48		6

Notes: Empty H_2O
Leak check @ 16

Field Data Sheet

Comparison / Engineering

Date 11/19/98
Test Method 0060.7
Concurrent Testing 2SA
Run # 6
Operator CDB Support DKB
Temperature, Am (Ta) 55
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0
Filters

Client/Plant/Location: OSU East
Probe 3-2 Cp .8053837 Heat Set 250
Pilot Pretest in in/m
Leak Check Post in in/m
Nozzle SBC2 .988
Sample Box Heat Set 250
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest cfm Init
Leak Check Post .005 cfm 16 Init
Moisture 23 Tdb Twb

Stack Diagram
Cyclonic Flow ?

Traverse Point Number	Sampling Time (θ) min	Clock Time (24hr)	Dry Gas Meter Reading (Vm) cu ft	Velocity Head (ΔPs) in H2O	Orifice Pressure (ΔH) in H2O DESIRED	Orifice Pressure (ΔH) in H2O ACTUAL	STACK Ts °F Amb:	METER Inlet/Avg °F Amb:	METER Outlet °F Amb:	PROBE Tp °F Amb:	OVEN/Filter °F Tn Amb:	IMPINGER Outlet °F Ti Amb:	AUX °F Tx	Vac in Hg
	1657	1657	858.661											
1	5		860.47	.0004	.1845	.18	150	69	68	283	261	48		5
1	10	1707	862.10	.0004	.1845	.18	150	69	67	280	260	47		5
2	15		863.83	.0005	.2307	.23	150	69	66	279	263	47		5
2	20	17	865.76	.0006	.2768	.28	155	69	67	275	261	47		6
3	25		867.05	.0004	.1845	.18	153	70	66	279	261	47		5
3	30	27	868.00	.0003	.1384	.14	151	69	66	282	263	48		5
4	35		869.62	.0004	.1845	.18	152	69	66	284	263	49		5
4	40	37	871.77	.0010	.4613	.46	159	69	66	282	263	46		5
5	45		874.03	.0010	.4613	.46	151	69	66	282	261	47		6
5	50	47	876.28	.0005	.2307	.23	152	71	67	279	264	49		6
6	55		877.49	.0004	.1845	.18	153	71	66	281	263	50		5
6	60	57	879.62	.0007	.3229	.32	154	70	67	284	266	52		6
6	65		881.55	.0007	.3229	.32	152	70	66	281	263	52		6
6	70	1807	882.74	.0004	.1845	.18	150	71	67	282	265	52		5
5	75		884.30	.0004	.1845	.18	150	70	67	284	263	52		5
5	80		885.75	.0004	.1845	.18	150	70	67	284	264	53		5
4	85		887.25	.0004	.1845	.18	150	69	66	279	263	54		5
4	90		888.50	.0003	.1384	.14	150	69	67	282	264	55		5
3	~~95~~ 93 2/10		889.450	.0003	.1384	.14	151	69	67	283	264	55		5
3	100	1851												
2	105													
2	110													
1	115													
1	120													

West Point

West ~~South~~ Point

Notes: Damper switch @ 1831

Field Data Sheet

Date	11/19/98
Test Method	9 ODEQ 7
Concurrent Testing	25A
Run #	7 cyc 2
Operator CDB Support	DRB
Temperature, Amb (Ta)	55
Pressure, Bar (Pb)	30.44
Pressure, Static (Pstat)	0

MB AH Y
6 1.6903 .99086

Stack Diagram

Filters

Cyclonic Flow ?

Client/Plant/Location:	OSU West
Probe 3-1 Cp .79	Heat Set 250
Pitot Pretest 5 in 0	lw/min
Leak Check Post in	lw/min
Nozzle	
Sample Box	Heat Set 250
Meter Box 9 dH@ 1.82334	Y .99066
Meter Pretest .005 cfm 15	Inl
Leak Check Post cfm	Inl
Moisture 2.5 Tdb Twb	

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O inH2O	Orifice Pressure inH2O Actual (dH)	Probe °F (Ts) Amb:	Box 1 °F Inlet/Avg (Tm In) Amb:	Box 1 °F Outlet (Tm out) Amb:	Pitot °F (Tp) Amb:	Oven/Filter °F (To) Amb:	Impinger Outlet °F (Ti) Amb:	Aux °F (Ta)	Pump Vacuum inHg (Pv)
		1903	890.212											
1	5		893.23	.0014	.6458	.65	151	65	65	273	235	468		5
South 1	10			.0017	.7842	.78	151	65	64	270	270	38		7
Port 2	15			Calibrating			JU	M						
2	20		901.42	.0014										
3	25		903.51	.0014	.6458	.65	155	68	65	272	261	38		7
3	30		906.35	.0018	.8304	.83	156	69	64	273	260	38		9
4	35		909.26	.0017	.7842	.78	159	69	65	272	258	36		9
4	40		911.80	.0016	.7381	.74	159	71	65	273	260	37		7
5	45		914.23	.0015	.6920	.69	159	71	65	272	260	38		7
5	50		916.63	.0014	.6458	.65	159	71	65	274	259	39		7
6	55		924540	.0016	.7381	.74	159	71	66	273	260	40		8
6	60	2003	926.	.0016		.74	159	72	66	272	258			7
6	65		927.	.0012		.74	159	72	66	272	258			7
6	70		929.	.0011		.74	159	72	66	272	258			7
5	75		930.8	.0011		.59	159	72	66	272	258			6
5	80		932.21	.0010		.59	159	72	66	274	258			6
4	85		934.740	.0010	.470	.47	159	72	66	272	258	44		5
4	90		936.995	.0016		.47	159	72	66	262	258	44		5
3	95	2038	939.21	.0017	.822	.82	159	72	66	262	258	44		8
3	100		941.39	.0013	.628	.63	159	72	66	261	257	44		7
2	105		943.72	.0010		.62	159	71	66	261	257	49		7
2	110		946.12	.0010		.62	159	71	66	262	257	49		7
1	115		948.4999	.0012		.62	159	71	66	260	251	50		7
1	120	2103	950.451	.0011		.53	159	71	66	260	257	50		7

Notes: Problem with Meter Box #9 Pump, switched to Meter Box #6 Resulted in delayed start

Field Data Sheet

Date	11-19-92
Test Method	00EQ7
Concurrent Testing	25A
Run #	7 Cent Cyc2
Operator	ORB Support COB
Temperature, Amb	(Ta) 48
Pressure, Bar	(Pb) 30.44
Pressure, Static	(Pstat) 0
Filters	

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location	OSU West
Probe	S-1 Cp — Heat Set
Pilot	Pretest — in — in/ml
Leak Check	Post 4 in 0.0 in/ml
Nozzle	S88
Sample Box	Heat Set
Meter Box	6 dH@ Y
Meter	Pretest — cfm — inHg
Leak Check	Post 0.005 cfm 11 inHg
Moisture	20 Twb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH@)	Orifice Pressure inH2O Actual (dH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	METER Inlet/Avg °F (Tm In) Amb:	METER Outlet °F (Tm out) Amb:	OVEN/Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		21	950.451											
east Port 1	5	1009	952.312	0014	707	.71	158	69	66	261	263	47		8
1	10		955.495	.0015		.74	158	69	66	271	261	47		8
2	15		957.740	.0010	.505	.51	159	69	66	258	263	97		7
2	20		960.100	.0010	.505	.51	158	69	66	270	262	48		7
3	25		962.290	.001		.5	158	69	65	270	262	49		7
3	30		964.520	.001		.5	158	69	65	270	262	50		7
4	35		966.810	.001		.5	158	69	65	270	261	52		7
4	40		969.000	.001		.5	158	69	65	270	261	53		7
5	45		971.050	.0010	.66	.5	158	69	65	270	262	53		7
5	50		973.520	.0013	.66	.66	159	70	65	271	263	53		7
6	55		976.000	.0011	.556	.56	159	70	65	271	262	53		6
6	60	2209	978.200	.0010		.50	159	71	66	271	262	54		6
6	65		980.200	.0012	.61	.61	159	71	66	271	260	53		8
6	70	2219	982.318	.0010	.505	.51	158	71	66	270	264	55		6
5	75													
5														
4														
4														

Notes:

Field Data Sheet

[redacted] orism [redacted] ngineering

Client/Plant/Location: OSO East

Date 11-18-98 11-19-98

Test Method 0060 7

Concurrent Testing 25A

Run # 8 cyc2

Operator DRD Support COD

Temperature, Amb (Ta) 43

Pressure, Bar (Pb) 30.44

Pressure, Static (Pstat) 0

Probe 3-2 Cp — Heat Set

Pilot — Pretest 4 in 0 — In/mi

Leak Check — Post — in — In/mi

Nozzle .988

Sample Box — Heat Set

Meter Box 6 dH@ 1.69 — Y .99

Meter — Pretest 0.006 cfm 11 — In/Hg

Leak Check — Post — cfm — In/Hg

Moisture 20

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) in H2O	Orifice Pressure (dH) in H2O	Stack Pressure (Ps) in Hg	STACK °F (Ts) Amb:	AFTER Inlet/Aug °F (Tm-in) Amb:	AFTER Outlet °F (Tm out) Amb:	Tdb CHORE °F (Tp) Amb:	OVEN Filter °F (Tf) Amb:	Twb IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Temp Vacuum in Hg (Pv)
		1039	982.666											
1	5		984.315	.0005	.260	.26	150	67	65	280	267	47		5
1	10		985.800	.0005		.26	150	64	65	229	266	47		5
2	15		987.290	.0010		.26	150	61	65	270	266	47		5
2	20		989.000	.0006		.26	150	69	65	270	266	47		5
3	25		990.800			.24	151	70	65	270	268	47		5
3	30		992.800	.0004		.24	151	70	65	270	268	47		5
4	35		984.550	.0006		.24	151	70	66	270	268	47		6
4	40		996.399	.0007	.364	.36	151	70	60	276	268	47		6
5	45		998. 0	.0006	.316	.32	152	71	66	269	269	49		6
5	50		1000. 0			.32	154	72	67	270	270	50		6
6	55		1002. 0			.32	154	72	67	270	270	51		6
6	60	1139	1004. 0			.32	155	72	67	270	270	51		6
6	65		1005. 0	.0007		.32	157	72	68	270	270	51		6
6	70		1007.520	.0007		.32	157	72	68	270	270	51		6
5	75		1009.720			.32	157	73	68	270	270	51		6
5	80		1011.62	.0005		.32	157	73	68	270	270	50		6
4	85		1013.455			.32	157	73	69	270	270	48		6
4	90		1015.77			.32	157	73	69	270	270	48		6
3	95		1016.2	.0008		.32	157	74	69	270	270	48		6
3	100		1018.71			.32	157	74	69	270	270	48		6
2	105		1020.50	.0004		.32	157	74	69	270	270	48		6
2	110		1022.35			.32	157	74	69	270	270	48		6
1	115		1024.15	.0008		.32	157	74	69	275	270	50		6
1	120	039	1026.002	.0007		.32	157	74	69	275	270	50		6

Notes:

Field Data Sheet

Date	11-20-98
Test Method	00 EQ 7
Concurrent Testing	25A
Run #	8 cont cycle
Operator	DRB Support CDB
Temperature, Amt (Ta)	45
Pressure, Bar (Pb)	30.44
Pressure, Static (Pstat)	0
Filters	

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location: OSU East

Probe	3-L	Cp		Heat Set
Pitot	Pretest	in		In/min
Leak Check	Post	in		In/m
Nozzle	.988			
Sample Box				Heat Set
Meter Box	6	dH@		Y
Meter	Pretest		cfm	Intl
Leak Check	Post	0.000	cfm 9	Intl
Moisture		Tdb	Twb	

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O (dH@)	Probe Pressure inH2O ACTUAL (dH)	STACK °F (Ts) Amb:	IMPACT Inlet/Avg °F (Tm-in) Amb:	IMPACT Outlet °F (Tm out) Amb:	FRONT °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		00:43	26.002											
1	5		27.87	.0006	317	.32	155	73	69	280	270	51		6
1	10		29.82	.0006		.32	155	73	70	275	269	50		6
2	15		30.65	.0008		.32	156	73	70	275	267	51		6
2	20		32.48	.0006		.32	156	73	70	276	267	51		6
3	25		34.31	.0008		.32	154	74	70	280	266	52		6
3	30		36.137	.0007		.30	154	74	70	280	266	52		6
4	35		37.999	.0007		.30	154	74	70	275	266	56		6
4	40		39.8	.0006		.29	154	74	70	276	266	58		6
5	45		42.61	.0006		.29	154	74	70	276	266	58		6
5	50		44.36	.0006		.29	154	74	70	276	266	59		6
6	55		46.27	.0007	.37	.38	153	74	70	270	265	54		7
6	60	1:43	48.05	.0007		.38	153	74	70	270	265	54		6
6	65		50.	.0007		.38	153	74	71	270	265	54		6
6	70		51.79	.0007		.38	153	74	70	270	265	55		6
5	75		53.68	.0007		.38	153	74	70	270	265	57		6
5	80		55.35	.0007		.38	153	74	71	270	265	57		6
4	85		57.35	.0006		.38	153	74	71	270	265	57		6
4	90		59.16	.0008		.38	153	74	71	270	265	57		6
3	95	2:18	60.874	.0006	.37	.32	153	74	71	270	265	58		6

Notes:

Field Data Sheet

Arizon / ngineering

Client/Plant/Location: OSU / West

Date 11-20-98

Test Method 0050 7

Concurrent Testing 25A

Run # 9 cyc 2

Operator Support

Temperature, Am (Ta) 48

Pressure, Bar (Pb) 30.44

Pressure, Static (Pstat) 0

Probe 7-1 Cp .79 Heat Set 250

Pilot Pretest 4.0 in 0.0 in/min

Leak Check Post in in/min

Nozzle .988

Sample Box Heat Set

Meter Box C dH@ 1.6 Y .99

Meter Pretest 0.010 cfm 14 in Hg

Leak Check Post cfm in Hg

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:	BEFORE Probe/Xad °F (Tm In) Amb:	BEFORE Probe Outlet °F (Tm out) Amb:	OVEN/ Filter °F (To) Amb:	OVEN/ Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		240	61.009											
1	5		62.42	.0003	.155	.16	145	71	70	255	246	44		4
1	10		64.19	.0005	.258	.26	146	71	70	260	250	47		4½
2	15		65.805	.0007	.362	.36	148	71	70	265	255	47		6
2	20		"	.0007		.36	148	71	69	265	255	47		6
3	25		"	.0007		.36	148	71	69	265	255			6
3	30		71.77	.0007		.35	155	73	70	265	255			6
4	35		73.70	.0008		.35	155	73	69	265	255			6
4	40		75.65	.0009		.35	156	74	70	260	255			6
5	45		77.465	.0008		.35	156	74	70	260	253			6
5	50		79.37	.0009		.34	156	74	71	260	250			6
6	55		81.	.0007		.33	156	74	71	260	250			6
6	60		83.17	.0008		.33	156	74	70	260	250			6
6	65		85.050			.33	156	74	70	260	250			6
6	70		86.95			.33	156	74	71	260	250			6
5	75		88.			.33	157	74	71	260	250			6
5	80		90.725			.35	157	74	71	260	250			6
4	85		92.62	.0007		.35	157	75	71	260	250			6
4	90		94.19	.0006	.30	.30	157	74	71	260	250			6
3	95		95.79	.0007		.35	157	75	71	260	255			6
3	100		97.63	.0007		.35		74	71	261	251			6
2	105		99.48	.0007		.35		74	71	261	251			6
2	110		101.25	.0006		.35		74	70	260	250			6
1	115		103.20	.0006		.35		74	70	260	250			6
1	120	440	105.049	.0005		.32		74	70	260	250			6

Notes:

Field Data Sheet

arizon ngineering

Client/Plant/Location: GSU / west

Date 11-20-98

Test Method 0050 7

Concurrent Testing 25A

Run # 9 cont 4+2

Operator DZB Support COD

Temperature, Amt (Ta) 50

Pressure, Bar (Pb)

Pressure, Static (Pstat)

Filters

Probe 3-1 Cp Heat Set

Pilot Pretest in in/mb

Leak Check Post 4 in 0.2 in/mb

Nozzle 988"

Sample Box Heat Set

Meter Box 6 dH@ Y

Meter Pretest cfm in/lg

Leak Check Post 0.004 cfm 8 in/lg

Moisture 20 Tdb Twb

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (Θ)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head (inH2O)	Orifice Pressure (inH2O) desired	Orifice Pressure (inH2O) actual (ΔH)	STACK °F (Ts) Avg	METER Inlet/Avg °F (Tm in) Avg	METER Outlet °F (Tm out) Avg	PROBE °F (Tp) Avg	OVEN Filter °F (Tn) Avg	IMPINGER Outlet °F (Ti) Avg	AUX °F (Tx)	Pump Vacuum in/lg (Pv)
		448	105.049											
1	5		106.85	.00005	.253	.25	578	72	71	270	265	268		6
1	10		108.644	.0007	.355	.35	157	73	71	265	263	.		6
2	15		110.55	.0006	.304	.30	157	74	70	268	262			6
2	20		112.25	.0006		.30	158	72	69	265	260			6
3	25		114.02	.0006		.30	158	72	69	265	260			6
3	30		115.87	.0006		.30	158	71	69	265	260			6
4	35		117.62	.0006		.30	158	71	69	265	260			6
4	40		119.42	.0005	.253	.25	157	71	68	260	250			6
5	45		121.23	.0007		.32	157	70	68	257	249			6
5	50		122.90	.0007		.32	157	70	68	257	249			6
6	55		124.56	.0006		.31	158	71	67	260	250			6
6	60	548	126.25	.0006		.31	158	71	67	260	250			6
6	65		127.92	.0006		.31	158	71	67	260	250			6
6	70		129.78	.0006		.31	158	71	67	260	250			6
5	75		131.64	.0006		.31	158	71	67	260	250			6
5	80		132.85	.0006		.31	158	71	67	260	250			6
4	85	613	135.36	.0006		.31	158	71	67	260	250			6
4	90	618	137.093	.0007		.31	158	71	67	260	250			6
15														
16														
17														
18														
19														
20														
21														

Notes:

Field Data Sheet

orizon ngineering

Date 11-20-98
Test Method ODEQ 7
Concurrent Testing 25A
Run # 10 Cyc 2
Operator DRS Support COB
Temperature, Amb (Ta) 50
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0
Filters


Stack Diagram

Client/Plant/Location: OSU East
Probe 3-2 Cp .805 Heat Set 250
Pilot Pretest 3.0 in 0.0 in/mh
Leak Check Post in in/mi
Nozzle .488 =
Sample Box Heat Set
Meter Box 6 dH@ 1.69 Y .99
Meter Pretest 0.005 cfm 11 inHg
Leak Check Post cfm inHg
Moisture 20 Tdb Twb
Cyclonic Flow ?

Traverse Point Number	Sampling Time min (Θt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Orifice Pressure (inH2O) (ΔPs)	Orifice Pressure (inH2O) DESIRED	Orifice Pressure (inH2O) ACTUAL (ΔH)	STACK °F (Ts) Anbt	PROBE Inlet/Avg °F (Tm in) Anbt	METER Outlet °F (Tm out) Anbt	FURNACE °F (Tp) Anbt	OVEN Filter °F (Ts) Anbt	IMPINGER Outlet °F (Ti) Anbt	AUX °F (Ta)	Pump Vacuum inHg (Pv)
		6:37	137.468											
South Port 1	5		139.57	.0008	.42	.42	145	66	65	269	245	49		6
1	10		141.6	.0006	.316	.32	146	67	66	267	252	49		6
2	15		143.	.0005		.28	147	68	65	260	255	47		6
2	20		145.	.0006		.29	147	68	65	268	258	48		6
3	25		147.	.0007		.29	147	68	65	268	258	48		6
3	30		148.345	.0005	.26	.26	147	68	65	268	259	48		5
4	35	7:12	150.15	.0005		.26	149	68	65	267	258	49		6
4	40		151.965	.0005		.26	149	68	65	268	260	48		6
5	45		153.74	.0006	.318	.32	150	68	64	267	253	49		6
5	50		155.54	.0006		.32	151	68	65	268	260	49		6
6	55		157.18	.0005	.26	.26	151	68	64	267	253	49		6
6	60	7:37	158.888	.0005	.26	.26	152	68	64	269	255	49		6
6	65		160.600	.0007	.37	.37	153	68	64	267	258	44		6
6	70		162.47	.0006		.32	153	68	64	267	255	44		6
5	75		164.34	.0007		.37	153	68	64	268	255	44		6
5	80	7:57	166.03	.0006		.32	152	68	65	267	255	44		6
4	85		168.13	.0007		.37	152	64	64	269	257	45		6
4	90		170.26	.0011	.5822	.58	152	69	65	268	261	45		7
3	95		171.72	.0005	.26	.26	154	69	65	268	259	47		5
3	100		173.06	.0011	.5822	.58	154	69	65	268	253	48		7
2	105		174.73	.0006	.318	.32	154	69	65	270	255	49		6
2	110		175.90	.0004	.2117	.21	153	68	65	267	256	49		5
1	115		177.56	.0005		.28	153	68	65	270	255	49		6
1	120	8:37	179.670	.0006		.32	154	69	65	269	259	51		6

Notes:

Field Data Sheet

Orion Engineering

Date 11/20/98
Test Method OOEQ 7
Concurrent Testing 25A
Run # 10 Cycle 2
Operator CDB Support DRB
Temperature, Amb (Ta) 50
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0
Filters

Stack Diagram

Cyclonic Flow ?

Client/Plant/Location: OSU East
Probe 3-2 Cp .805 Heat Set 250 °
Pitot Pretest in in/min
Leak Check Post in in/min
Nozzle
Sample Box Heat Set 250 °
Meter Box 6 dH@ 1.69025 Y .990476
Meter Pretest cfm inHg
Leak Check Post .003 cfm 9 inHg
Moisture 20 Tdb Twb

Traverse Point Number	Sampling Time min (Θ)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (ΔPs)	Orifice Pressure inH2O DP Std'd	Orifice Pressure inH2O DP Actual (ΔH)	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 (Ta)	Pump Vacuum inHg (Pv)
		743	179.690											
test 1	5		181.37	.0004	.2117	.21	149	68	65	270	255	47		6
Port 1	10		183.36	.0008	.4234	.42	149	68	65	267	259	46		6
2	15		185.13	.0001	.3703	.37	153	69	65	266	259	46		6
2	20		186.72	.0006	.3175	.32	156	69	65	267	256	46		6
3	25		188.32	.0006	.3175	.32	155	69	65	267	257	46		6
3	30		189.47	.0004	.2117	.21	156	69	65	267	258	47		5
4	35		—	.0003	.1588	.16	156	69	65	269	257	47		5
4	40		191.99	.0005	.2646	.26	157	68	66	269	256	46		6
5	45		193.57	.0004	.2117	.21	157	68	66	269	257	46		6
5	50		195.55	.0006	.3175	.32	156	69	66	268	255	46		7
6	55		196.82	.0004	.2117	.21	157	69	66	266	256	46		5
6	60		198.79	.0006	.3175	.32	158	69	66	269	255	47		6
6	65		200.41	.0005	.2646	.26	157	69	66	268	258	46		6
6	70		201.88	.0004	.2117	.21	157	69	66	267	257	46		6
5	75		203.38	.0005	.2646	.26	157	70	66	269	256	47		6
5	80		204.85	.0004	.2117	.21	157	69	66	267	260	48		6
4	85		206.33	.0004	.2117	.21	157	70	66	269	255	50		6
4	90		207.82	.0004	.2117	.21	157	70	66	269	258	52		6
3	95		209.10	.0004	.2117	.21	156	70	66	268	258	52		6
3	100		210.40	.0004	.2117	.21	157	70	66	269	255	52		6
2	105		212.28	.0006	.3175	.32	157	69	66	269	255	52		7
2	110	1033	213.645	.0003	.1588	.16	157	69	67	267	256	52		5
1	115													
1	120													

Notes: Pamper Switch @ 1033

Field Data Sheet

arizon **ngineering**

Date 11/20/98
Test Method ODEQ 7
Concurrent Testing 25A
Run # 11
Operator CDB Support DRB
Temperature, Amb (Ta) 50
Pressure, Bar (Pb) 30.49
Pressure, Static (Pstat) 0
Filters

Client/Plant/Location: OSU West
Probe 3-1 Cp .79 Heat Set 250
Pilot Pretest 4 in 0 in
Leak Check Post in in
Nozzle .988
Sample Box Heat Set 250
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest .003 cfm 15 in
Leak Check Post cfm in
Moisture 20 Tdb Twb

Stack Diagram
Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cf (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O (dH)	Probe Temperature (Tp)	STACK °F (Ts) Amb:	DRYER Inlet/Aft °F (Tcon in) Amb:	DRYER Outlet °F (Tcon out) Amb:	Heated Filter °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Fa Ve in (I
		1045	214.199											
1	5			.0017	.8665	.87	149	69	66	257	229	52		9
1	10													
2	15			Calibrating		JUMP								
2	20													
3	25		228.27											
3	30		231.04	.0015	.7645	.76	152	72	66	257	248	52		9
4	35		233.77	.0017	.8665	.87	153	72	66	256	249	52		9
4	40		236.54	.0016	.8155	.82	157	73	67	258	250	54		9
5	45		238.89	.0013	.6626	.66	158	73	67	257	252	55		8
5	50		241.33	.0013	.6626	.66	158	72	67	258	249	56		8
6	55		242.69	.0003	.1529	.15	160	72	67	257	250	57		5
6	60		244.85	.0010	.5097	.51	160	71	68	258	250	52		8
6	65		246.75	.0008	.4078	.41	160	72	67	257	249	51		6
6	70		249.27	.0013	.6626	.66	161	72	68	258	252	50		9
5	75		250.82	.0005	.2548	.25	160	72	68	257	250	50		6
5	80		252.79	.0007	.3568	.36	161	72	68	258	249	51		7
4	85		254.86	.0008	.4078	.41	161	72	68	257	250	51		7
4	90		256.94	.0007	.3568	.36	161	72	68	257	249	52		7
3	95		259.10	.0006	.3058	.31	161	72	68	257	248	53		7
3	100		261.29	.0011	.5607	.56	161	72	68	257	250	54		8
2	105		263.62	.0010	.5097	.51	161	72	68	257	249	55		8
2	110		264.92	.0003	.1529	.15	160	73	68	258	251	51		5
1	115		266.17	.0015	.7645	.76	160	72	68	259	249	50		5
1	120	1245	268.710	.0010	.5097	.51	161	72	68	258	251	47		7

south Port

Notes:

Field Data Sheet

Horizon Engineering

Date 11/20/98
Test Method 5DEQ7
Concurrent Testing 25A
Run # 11
Operator CDG Support DRB
Temperature, Amb (Ta) 50
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU West Cyclone
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 6 dH@ 1.69025 Y .99086
Meter Pretest .003 cfm 15 in
Leak Check Post .003 cfm 14 in

Stack Diagram

Filters

Cyclonic Flow ?

Moisture 20 Tdb Twb

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	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/Aug °F (Tain/a) Amb:	AFTER Outlet °F (Tao out) Amb:	FRONT °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Fuel Vac in (F
		1252	268.710											
1 1	5		272.86	.0016	.8155	.82	153	71	68	262	260	45		11
1	10		275.42	.0016	.8155	.82	155	71	68	257	247	44		11
2	15		277.20	.0016	.8155	.82	156	71	68	258	246	44		11
2	20		280.05	.0014	.7136	.71	160	71	68	256	246	44		11
3	25		283.30	.0020	1.0194	1.1	160	72	68	256	249	44		13
3	30		286.12	.0018	.9174	.92	160	73	68	256	248	45		13
4	35		288.91	.0018	.9174	.92	159	73	67	[illegible]	248	46		11
4	40		291.70	.0010	.5097	.51	161	74	68	[illegible]	248	46		11
5	45		294.49	.0010	.5097	.51	160	74	67	257	248	47		11
5	50		296.91	.0014	.7136	.71	160	74	68	257	[illegible]	46		11
6	[illegible]		+.-	.0010	.5097	.51	160	74	[illegible]	258	250	46		11
6	60		301.92	.0013	.6626	.66	158	74	68	257	248	44		9
6	65		304.39	.0013	.6626	.66	159	74	68	257	246	44		9
6	[illegible]		306.47	.0009	.4587	.46	160	74	68	256	247	44		8
5	75		308.51	.0009	.4587	.46	160	74	68	257	248	44		8
5	80		310.80	.0010	.5097	.51	161	74	68	258	248	45		9
4	85		313.18	.0012	.6116	.61	161	74	68	257	248	45		10
4	90		315.41	.0010	.5097	.51	160	74	69	257	247	46		8
3	95		318.41	.002	1.0194	1.0	160	74	68	257	248	47		10
3	100		320.57	.0008	.4078	.41	160	75	69	255	248	45		8
2	~~105~~	1434	321.524	.0013	.6626	.66	160	73	69	256	248	47		10
2	110													
1	115													
1	120													

East
1-1

Notes: Damper switch @ 1434

Field Data Sheet

Orion Engineering

Client/Plant/Location: OSU East Cycle 2

Date 11/20/98
Test Method DOEQ 7
Concurrent Testing 25A
Run # 12
Operator CDA Support DRB
Temperature, Am (Ta) 50
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Probe 3-2 Cp .89537 Heat Set 250
Pilot Pretest 4 in 0 In/m
Leak Check Post in In/m
Nozzle .988
Sample Box Heat Set 250
Meter Box 6 dH@ 1.68025 Y .99086
Meter Pretest .005 cfm 15 Inl
Leak Check Post cfm Inl
Moisture 20 Tdb Twb

Filters

Stack Diagram

Cyclonic Flow ?

Traverse Point Number	Sampling Time min (dt)	Clock Time (24hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head inH2O (dPs)	Orifice Pressure inH2O ΔH@RHO	Stack Pressure inH2O Actual (-Pg)	STACK °F (Ts) Avg:	AFTER Inlet/Avg °F (Tm in) Avg:	AFTER Outlet °F (Tm out) Avg:	OVEN °F (Tp) Avg:	OVEN After °F (To) Avg:	IMPINGER Outlet °F (Ti) Avg:	Aux °F (Ta)	Form Vacuum inHg (Ps)
		1445	321.869											
South Port 1	5			.0004	.2097	.21	150	71	69	269	249	50		5
1	10													
2	15													
2	20			Recal	JUNK									
3	25													
3	30		331.69											
4	35		333.32	.0003	.1572	.16	149	71	68	268	254	44		5
4	40		335.36	.0006	.3145	.31	148	71	68	266	252	44		6
5	45		336.99	.0005	.2621	.26	151	71	68	267	254	44		5
" 5	50		338.34	.0003	.1572	.16	152	71	68	268	257	48		5
" 6	55		339.71	.0003	.1572	.16	150	71	68	268	254	50		5
" 6	60		341.33	.0004	.2097	.21	152	71	68	269	255	49		6
" 6	65		342.68	.0003	.1572	.16	152	71	68	267	255	49		5
" 6	70		344.35	.0004	.2097	.21	152	71	68	267	253	50		5
" 5	75		346.02	.0004	.2097	.21	151	71	68	267	258	50		5
" 5	80		348.10	.0006	.3145	.31	152	71	68	255	267	51		7
" 4	85		350.17	.0007	.3669	.37	154	72	68	266	253	49		7
" 4	90		352.18	.0007	.3669	.37	154	72	68	267	254	49		7
" 3	95		354.05	.0006	.3145	.31	154	72	68	267	255	48		7
" 3	100		356.22	.0006	.3145	.31	154	72	68	268	256	47		7
" 2	105		357.63	.0005	.2621	.26	154	72	68	267	256	48		6
" 2	110		359.04	.0005	.2621	.26	155	72	68	267	254	48		6
" 1	115		360.45	.0005	.2621	.26	155	72	68	267	254	48		6
" 1	120	1645	362.527	.0005	.2621	.26	155	72	68	267	254	48		6
"														

Notes:

Field Data Sheet

[redacted] *arison* [redacted] *ngineering*

Date 11/20/98
Test Method OOEQ 7
Concurrent Testing 25A
Run # 12
Operator CDB Support DRB
Temperature, Amb (Ta) 50
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Client/Plant/Location: OSU East Cycle 2
Probe 3-2 Cp .80537 Heat Set 250
Pilot Pretest in in/h
Leak Check Post in in/h
Nozzle .988
Sample Box Heat Set 250
Meter Box 6 dH@ 1.69025 Y .99086
Meter Pretest cfm inl
Leak Check Post .008 cfm 8 inl
Moisture 20 Tdb Twb

Stack Diagram

Filters

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 dH@	Orifice Pressure inH2O sq root (dH)	STACK °F (Ts) Amb:	BEFORE Probe/Aft °F (Tm In) Amb:	BEFORE Filter Outlet °F (Tm out) Amb:	DRYER °F (Tp) Amb:	DRYER Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	AUX °F (Ta)	Pump Vacuum inH2O (Ps)
1	5		364.23	.0003	.1572	.16	152	71	68	268	257	50		6
1	10		365.92	.0004	.2097	.21	152	71	68	267	252	49		6
2	15		367.57	.0004	.2097	.21	152	71	69	267	255	49		6
2	20		369.55	.0005	.2621	.26	151	71	68	267	255	51		6
3	25		370.99	.0004	.2097	.21	152	72	68	263	255	51		6
3	30		372.37	.0003	.1572	.16	152	72	68	263	255	52		6
4	35		373.88	.0004	.2097	.21	153	72	68	267	251	52		6
4	40		374.99	.0005	.2621	.26	154	72	68	269	252	52		6
5	45		376.03	.0003	.1572	.16	153	71	68	267	254	52		6
5	50		377.10	.0004	.2097	.21	154	71	68	269	254	51		6
6	55		378.13	.0004	.2097	.21	154	71	68	270	260	51		6
6	60	1749	379.153	.0004	.2097	.21	154	71	69	269	254	51		6
6	65	[redacted]	381.02	.0004	.2097	.21	154	71	69	269	254	51		6
6	70		382.97	.0003	.1572	.16	154	71	68	267	255	51		6
5	75		384.30	.0003	.1572	.16	154	71	68	267	253	50		6
5	80		385.92	.0005	.2621	.26	154	70	68	269	252	51		6
4	85		387.61	.0003	.1572	.16	156	71	68	268	254	50		6
4	90		388.89	.0004	.2097	.21	156	71	68	267	253	51		6
3	95		390.19	.0004	.2097	.21	156	71	68	270	255	52		6
3	100	1834	391.296	.0005	.2621	.26	156	[redacted]	68	270	252	54		7
2	105													
2	110													
1	115													
1	120													

Notes: Damper switch @ 1834

Field Data Sheet

Orizon Engineering

Client/Plant/Location: OSU West Cyclone

Date 11/20/98
Test Method 5 DEQ 7
Concurrent Testing 25A
Run # 13
Operator CDB Support DRB
Temperature, Am (Ta) 50
Pressure, Bar (Pb) 30.44
Pressure, Static (Pstat) 0

Probe 3-1 Cp .79 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 6 dH@ 1.690 Y .99086
Meter Pretest .005 cfm 15 inHg
Leak Check Post cfm inHg

Stack Diagram

Filters Cyclonic Flow ? Moisture 35 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: 1849				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5		391.752	.0018	.1722	.72	167	70	68	257	238	46		7
2 1			.											
3 2	15		.											
4 2	20		.	Recal	JUM									
5 3	25		.											
6 3	30		404.37											
7 4	35		408.43	.0011	.3472	.48	176	78	70	255	238	60		11
8 4	40		410.42	.0009	.3618	.36	177	74	69	252	237	65		9
9 5	45		412.19	.0009	.3618	.36	176	74	69	258	237	49		9
10 5	50		413.99	.0009	.3618	.36	176	73	69	254	237	46		9
11 6	55		416.43	.0013	.5226	.52	176	73	69	258	238	45		11
12 6	60	1949	418.35	.0010	.4020	.40	177	74	69	258	237	43		9
13 6	65		419.44	.0002	.0804	.08	176	74	69	258	239	45		6
14 6	70		—.—	.0007	.2814	.28	176	73	69	261	238	46		9
15 5	75		423.11	.0006	.2412	.24	176	73	69	259	237	45		7
16 5	80		424.37	.0009	.1608	.16	177	73	69	259	237	46		6
17 4	85		425.99	.0006	.2412	.24	176	72	69	260	238	46		6
18 4	90		428.00	.0011	.4472	.44	177	72	69	259	239	46		7
19 3	95		.	.0011	.4422	.44	176	73	69	258	237	45		7
20 3	100		.	.0010		.44	176	73	69	258	239	44		7
21 2	105	2034	434.60	.0010		.44	176	73	68	256	239	43		9
22 2	110	2055 2100	436.308	.0008	.321	.32	167	69	68	260	239	52		7
23 1	115	2137 2142	438.17	.0005	.201	.20	172	67	66	264	239	52		7
24 1	120	2147	439.669	.0006	.24	.24	172	67	66	262	238	53		7
25			.											

South Port

Notes:

* Kiln off to ✓ H_2O % of wood
* Scrubber flow (—.20) Blue 25' umb. — is done

Field Data Sheet

orizon ngineering

Client/Plant/Location: OSW Wash

Date 11-20-98

Test Method OREO 7

Concurrent Testing 25A

Run # 13 cont Cyc 2

Operator DRB Support CLS B

Temperature, Am (Ta) 50

Pressure, Bar (Pb) 30.44

Pressure, Static (Pstat) 0

Stack Diagram

Filters

Cyclonic Flow ?

Probe 3-L Cp Heat Set °F

Pitot Pretest in in/min

Leak Check Post 4 in 0.0 in/min

Nozzle .256

Sample Box Heat Set °F

Meter Box C dH@ Y

Meter Pretest cfm inHg

Leak Check Post 0-010 cfm ~~10~~ 10½ inHg

Moisture 3~~5~~ 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)
		2153	434.669											
1 1	125		442.05	.0015	603	.60	174	68	66	260	246	52		7
2 1	130	2203	444.35	.0014		.56	174	68	66	260	245	51		7
3 2	135		446.55	.0014		.56	174	69	66	260	240	52		7½
4 2	140		448.	.0016	.5510 ~~603~~	[illegible] .55	174	69	66	260	240	52		7½
5 3	145		451.09	.0016		.55	174	70	66	259	239	55		8
6 3	150		453.333	.0016		.55	174	72	67	259	239	58		8
7 4	155		455.68	.0016		56	175	73	68	260	239	63		8
8 4	160	2233	458.008	.0017		.55	175	74	68	260	242	66		9
9			.											
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: OSW / East

Date 11-20-98

Test Method OEQ 7

Concurrent Testing 25A

Run # 4 4c2

Operator DRP Support CDB

Temperature, Am (Ta) 50

Pressure, Bar (Pb) 30.44

Pressure, Static (Pstat) 0

Probe 3-2 Cp Heat Set 250 °F

Pitot Pretest 4 in 0.0 in/min

Leak Check Post 4 in 0.0 in/min

Nozzle .988

Sample Box Heat Set °F

Meter Box 6 dH@ Y

Meter Pretest 0.004 cfm 11 inHg

Leak Check Post 0.005 cfm 9 inHg

Stack Diagram

Filters Cyclonic Flow? Moisture 35 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)
		2254	458.352				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:		
1 1	5		459.39	.0003	.103	.10	173	70	68	266	262	50		4
2 1	10		461.	.00006	.206	.21	174	71	69	264	260	49		6
3 2	15		463.			.25	174	74	69	264	260	49		6
4 2	20		465.			.25	174	74	69	264	260	49		6
5 3	25		466.			.25	174	74	69	264	260	49		6
6 3	30		468.09			.25	174	74	69	267	262	48		6
7 4	35		469.80	.0007		.25	175	74	70	266	266	50		6
8 4	40		471.50	.0006		.21	175	74	70	266	266	50		6
9 5	45		473.15	.0006		.21	175	74	70	267	267	51		6
10 5	50		474.25	.0005	.172	.17	175	74	71	267	263	54		5
11 6	55	2349	475.999	.0007		.25	175	74	70	265	265	55		5
12 6	60	2354	477.21	.0006		.21	174	74	71	266	266	51		5½
13 6	65		479.20	.0006		.21	175	74	71	266	269	50		6
14 6	70	0:04	480.72	.0006		.21	175	75	71	266	267	51		6
15 5	75		482.31	.0006		.21	175	75	71	270	265	53		6
16 5	80		483.83	.0006		.21	175	74	71	270	268	53		6
17 4	85		485.42	.0006		.21	175	74	71	268	264	54		6
18 4	90		486.73	.0005	.17	.17	176	74	71	268	268	55		5
19 3	95	0:29	488.007	.0005		.17	175	74	71	266	268	56		5
20 ~~3 100~~														
21 2 ~~105~~														
22 3 110														
23 1 ~~115~~														
24 1 120														
25														

Notes:

Blank Correction

Willamette Ind. - OSU										16-Nov-98
Wood Kiln - Hemlock										drb/cdb
Corvallis, OR										cyclrunw
EPA 1-4, ODEQ 5										mew
BLANKS										
Acetone	200	ml	0.0000	gm			0.00			mg/100ml
H2O, Residue	200	ml	0.0024	gm			1.20			mg/100ml
H2O, DCM	200	ml	0.0000	gm			0.00			mg/100ml
Filter-Front	m98-291	ID	0.0002	gm						
Filter-Back	na	ID	0.0000	gm						
RUNS			Combined		Run 1&3	Run 5	Run 7	Run 9	Run 11	Run 13	Total
Total sample volumes	Vm(dscf) + Vw(scf)				71.12	120.35	100.87	86.07	88.49	110.82	577.72
ACETONE-Front	Volume	ml	216								
	Weight	mg	5.4								
	Blank	mg/100ml	0.00								
	Correction	mg	0.00								
	Net	mg	5.40		0.66	1.12	0.94	0.80	0.83	1.04	6.6%
ACETONE-Back	Volume	ml	235								
	Weight	mg	40.1								
	Blank	mg/100ml	0.00								
	Correction	mg	0.00								
	Net	mg	40.10		4.94	8.35	7.00	5.97	6.14	7.69	48.8%
IMP WATER-Residue	Volume	ml	200		139.2	47.1	0.7	8.1	3.2	1.6	
	Weight	mg	11.6		1.1	0.8	2.8	1.2	2.0	3.7	
	Blank	mg/100ml	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
	Correction	mg	-2.00		-1.39	-0.47	-0.01	-0.08	-0.03	-0.02	
	Net	mg	9.60		0.00	0.33	2.79	1.12	1.97	3.68	11.7%
IMP WATER-Extract (DCM)	Volume	ml	200.0		139.2	47.1	0.7	8.1	3.2	1.6	
	Weight	mg	23.7		4.7	3.1	2.9	5.3	2.7	5.0	
	Blank	mg/100ml	0.00		0.00	0.00	0.00	0.00	0.00	0.00	
	Correction	mg	0.00		0.00	0.00	0.00	0.00	0.00	0.00	
	Net	mg	23.70		4.70	3.10	2.90	5.30	2.70	5.00	28.9%
FILTER-Front	ID		m98-169								
	Weight	mg	3.3		0.41	0.69	0.58	0.49	0.51	0.63	4.0%
FILTER-Back	ID		s96-18								
	Weight	mg	0.0		0.00	0.00	0.00	0.00	0.00	0.00	0.0%
FRONT HALF TOTAL		mg	8.70		1.07	1.81	1.52	1.30	1.33	1.67	10.6%
BACK HALF TOTAL		mg	73.40		9.64	11.78	12.70	12.39	10.81	16.38	89.4%
TOTAL	mn	mg	82.10		10.71	13.59	14.21	13.69	12.14	18.04	
PERCENT BACK HALF		%	89.4%		90.0%	86.7%	89.3%	90.5%	89.0%	90.8%	

Blank Correction

Willamette Ind. - OSU										16-Nov-98
Wood Kiln - Hemlock										drb/cdb
Corvallis, OR										cyclrune
EPA 1-4, ODEQ 5										mew
BLANKS										
Acetone	200	ml	0.0000	gm			0.00			mg/100ml
H2O, Residue	200	ml	0.0024	gm			1.20			mg/100ml
H2O, DCM	200	ml	0.0000	gm			0.00			mg/100ml
Filter-Front	m98-291	ID	0.0002	gm						
Filter-Back	na	ID	0.0000	gm						
RUNS			Combined		Run 2	Run 4	Run 6	Run 8	Run 10	Run 12	Total
Total sample volumes	Vm(dscf) + Vw(scf)				75.77	105.64	109.55	75.77	102.05	77.95	546.74
ACETONE-Front	Volume	ml	118								
	Weight	mg	1.7								
	Blank	mg/100ml	0.00								
	Correction	mg	0.00								
	Net	mg	1.70		0.24	0.33	0.34	0.24	0.32	0.24	1.3%
ACETONE-Back	Volume	ml	195								
	Weight	mg	74.0								
	Blank	mg/100ml	0.00								
	Correction	mg	0.00								
	Net	mg	74.00		10.26	14.30	14.83	10.25	13.81	10.55	57.5%
IMP WATER-Residue	Volume	ml	200		168.1	26.6	3.1	1.0	0.8	0.4	
	Weight	mg	25.2		2.2	21.5	0.5	0.1	0.2	0.7	
	Blank	mg/100ml	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
	Correction	mg	-2.00		-1.68	-0.27	-0.03	-0.01	-0.01	-0.00	
	Net	mg	23.20		0.52	21.23	0.47	0.09	0.19	0.70	18.0%
IMP WATER-Extract (DCM)	Volume	ml	200.0		168.1	26.6	3.1	1.0	0.8	0.4	
	Weight	mg	26.0		6.6	5.9	1.4	2.0	6.6	3.5	
	Blank	mg/100ml	0.00		0.00	0.00	0.00	0.00	0.00	0.00	
	Correction	mg	0.00		0.00	0.00	0.00	0.00	0.00	0.00	
	Net	mg	26.00		6.60	5.90	1.40	2.00	6.60	3.50	20.2%
FILTER-Front	ID		m98-209								
	Weight	mg	2.4		0.33	0.46	0.48	0.33	0.45	0.34	1.9%
FILTER-Back	ID		s96-011								
	Weight	mg	1.5		0.21	0.29	0.30	0.21	0.28	0.21	1.2%
FRONT HALF TOTAL		mg	4.10		0.57	0.79	0.82	0.57	0.77	0.58	3.2%
BACK HALF TOTAL		mg	124.70		17.58	41.72	17.00	12.55	20.88	14.96	96.8%
TOTAL	mn	mg	128.80		18.15	42.51	17.82	13.12	21.65	15.55	
PERCENT BACK HALF		%	96.8%		96.9%	98.1%	95.4%	95.7%	96.5%	96.2%	

Blank Correction

Willamette Ind. - OSU										18-Nov-98
Wood Kiln - Hemlock										drb/cdb
Corvallis, OR										cyc2runw
EPA 1-4, ODEQ 5										mew
BLANKS										
Acetone	200	ml	0.0000	gm		0.00				mg/100
H2O, Residue	200	ml	0.0024	gm		1.20				mg/100
H2O, DCM	200	ml	0.0000	gm		0.00				mg/100
Filter-Front	m98-291	ID	0.0002	gm						
Filter-Back	na	ID	0.0000	gm						
RUNS			Combined		Run 1	Run 3	Run 5	Run 7	Run 9	Run 11	Run 11	Total
Total sample volumes	Vm(dscf) + Vw(scf)				35.16	127.08	127.87	122.34	98.35	144.53	115.66	770.99
ACETONE-Front	Volume	ml	104									
	Weight	mg	8.6									
	Blank	mg/100ml	0.00									
	Correction	mg	0.00									
	Net	mg	8.60		0.39	1.42	1.43	1.36	1.10	1.61	1.29	8.0%
ACETONE-Back	Volume	ml	200									
	Weight	mg	38.5									
	Blank	mg/100ml	0.00									
	Correction	mg	0.00									
	Net	mg	38.50		1.76	6.35	6.39	6.11	4.91	7.22	5.78	35.9%
IMP WATER-Residue	Volume	ml	200		62.1	118.8	9.8	5.7	0.0	2.9	0.8	
	Weight	mg	23.7		2.2	4.6	4.3	2.9	2.7	2.5	4.5	
	Blank	mg/100ml	1.00		1.00	1.00	1.00	1.00	1.50	1.00	1.00	
	Correction	mg	-2.00		-0.62	-1.19	-0.10	-0.06	-0.00	-0.03	-0.01	
	Net	mg	21.70		1.58	3.41	4.20	2.84	2.70	2.47	4.49	20.2%
IMP WATER-Extract (DCM)	Volume	ml	200.0		62.1	118.8	9.8	5.7	0.0	2.9	0.8	
	Weight	mg	28.8		1.9	3.9	3.4	5.6	3.5	3.6	6.9	
	Blank	mg/100ml	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Correction	mg	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net	mg	28.80		1.90	3.90	3.40	5.60	3.50	3.60	6.90	26.8%
FILTER-Front	ID		m98-212									
	Weight	mg	4.4		0.20	0.73	0.73	0.70	0.56	0.82	0.66	4.1%
FILTER-Back	ID		s96-016									
	Weight	mg	5.3		0.24	0.87	0.88	0.84	0.68	0.99	0.80	4.9%
FRONT HALF TOTAL		mg	13.00		0.59	2.14	2.16	2.06	1.66	2.44	1.95	12.1%
BACK HALF TOTAL		mg	94.30		5.48	14.53	14.87	15.39	11.79	14.28	17.96	87.9%
TOTAL	mn	mg	107.30		6.07	16.67	17.02	17.46	13.45	16.72	19.91	
PERCENT BACK HALF		%	87.9%		90.2%	87.1%	87.3%	88.2%	87.7%	85.4%	90.2%	

Blank Correction

Willamette Ind. - OSU											18-Nov-98
Wood Kiln - Hemlock											drb/cdb
Corvallis, OR											cyc2rune
EPA 1-4, ODEQ 5											mew
BLANKS											
Acetone	200	ml	0.0000	gm			0.00				mg/100
H2O, Residue	200	ml	0.0024	gm			1.20				mg/100
H2O, DCM	200	ml	0.0000	gm			0.00				mg/100
Filter-Front	m98-291	ID	0.0002	gm							
Filter-Back	na	ID	0.0000	gm							
RUNS			Combined		Run 2	Run 4	Run 6	Run 8	Run 10	Run 12	Run 12	Total
Total sample volumes	Vm(dscf) + Vw(scf)				113.11	140.90	120.15	101.40	99.88	93.42	52.23	721.08
ACETONE-Front	Volume	ml	148									
	Weight	mg	7.1									
	Blank	mg/100ml	0.00									
	Correction	mg	0.00									
	Net	mg	7.10		1.11	1.39	1.18	1.00	0.98	0.92	0.51	6.2%
ACETONE-Back	Volume	ml	174									
	Weight	mg	48.5									
	Blank	mg/100ml	0.00									
	Correction	mg	0.00									
	Net	mg	48.50		7.61	9.48	8.08	6.82	6.72	6.28	3.51	42.0%
IMP WATER-Residue	Volume	ml	200		163.2	32.1	3.0	0.8	0.5	0.3	0.2	
	Weight	mg	17.1		3.3	4.3	3.1	1.9	2.6	1.5	0.4	
	Blank	mg/100ml	1.00		1.00	1.00	1.00	1.00	1.50	1.00	1.00	
	Correction	mg	-2.00		-1.63	-0.32	-0.03	-0.01	-0.01	-0.00	-0.00	
	Net	mg	15.10		1.67	3.98	3.07	1.89	2.59	1.50	0.40	13.1%
IMP WATER-Extract (DCM)	Volume	ml	200.0		163.2	32.1	3.0	0.8	0.5	0.3	0.2	
	Weight	mg	40.8		12.8	11.8	3.0	1.6	3.7	2.0	5.9	
	Blank	mg/100ml	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Correction	mg	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Net	mg	40.80		12.80	11.80	3.00	1.60	3.70	2.00	5.90	35.4%
FILTER-Front	ID		m98-176									
	Weight	mg	2.4		0.38	0.47	0.40	0.34	0.33	0.31	0.17	2.1%
FILTER-Back	ID		s96-017									
	Weight	mg	1.5		0.24	0.29	0.25	0.21	0.21	0.19	0.11	1.3%
FRONT HALF TOTAL		mg	9.50		1.49	1.86	1.58	1.34	1.32	1.23	0.69	8.2%
BACK HALF TOTAL		mg	105.90		22.31	25.55	14.40	10.52	13.22	9.98	9.92	91.8%
TOTAL	mn	mg	115.40		23.80	27.41	15.98	11.86	14.53	11.21	10.61	
PERCENT BACK HALF		%	91.8%		93.7%	93.2%	90.1%	88.7%	90.9%	89.0%	93.5%	

ANTECH

Analysis/Technology

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

December 14, 1998 — Identification: Willamette Industries/OSU - Horizon #1079
Job # 9832612-26 — Date received: 11/22/98

Sample #	32612	32613	32614	32615	32616
Identification:	OSU east cycle 1	OSU east cycle 1	OSU east blanks	OSU east C1 R2	OSU east C1 R4
Front acetone:					
volume (mls)	118	216	200		
residue (g)	0.0017	0.0054	-0.0001		
Back acetone:					
volume (mls)	195	235			
residue (g)	0.2071	0.0401			
Back acetone:					
volume (mls)	195				
residue (g)	0.0740 (after removal of large plastic fragments)				
Impinger water:					
volume (mls)			200	668	830
residue (g)			0.0024	0.0022	0.0215
DCM:					
residue (g):			-0.0001	0.0066	0.0059
Filters:					
number	98M-209	98M-169			
residue (g):	0.0024	0.0033			
Filters:					
number	96S-11	96S-16			
residue (g)	0.0015	-0.0013			

Respectfully submitted:
ANTECH

Diana Tracy
president

501 N.E. THOMPSON MILL ROAD
CORBETT, OREGON 97019
503/695-2135
FAX 503/695-2139

ANTECH

Analysis/Technology

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

December 14, 1998 — Identification: Willamette Industries/OSU - Horizon #1079
Job # 9832612-26 — Date received: 11/22/98

Sample #	32617	32618	32619	32620	32621
Identification:	OSU east C1 R6	OSU east C1 R8	OSU east C1 R10	OSU east C1 R12	OSU west C1 R3
Impinger water:					
volume (mls)	410	428	500	551	795
residue (g)	0.0005	0.0001	0.0002	0.0007	0.0011
DCM:					
residue (g):	0.0014	0.0020	0.0066	0.0035	0.0047

Sample #	32622	32623	32624	32625	32626
Identification:	OSU west C1 R5	OSU west C1 R7	OSU west C1 R9	OSU west C1 R11	OSU west C1 R3
Impinger water:					
volume (mls)	655	480	468	466	813
residue (g)	0.0008	0.0028	0.0012	0.0020	0.0014
DCM:					
residue (g):	0.0031	0.0029	0.0053	0.0027	0.0034

Respectfully submitted:
ANTECH

Diana Tracy
president

501 N.E. THOMPSON MILL ROAD
CORBETT, OREGON 97019
503/695-2135
FAX 503/695-2139

this is the re-weighing of this sample after removing the "foreign matter" ww

SAMPLE DATA: EPA RESIDUES
analyst: ww reviewer: _____
Job # 3216 Identification: Willamette Industries/OSU 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)					

SAVED 12-11-98

BACK ACETONE:	date gross 1:			date gross 2:	
Sample #	32612				
sample ID	OSU east cyclone				
cont. #					
vol mark	L				
(check if OK)					
volume(ml)	195 ml				
gross1(g)	107.0367	12-7			
gross2(g)	107.0387	12-8			
	107.0376	12-9			
	107.0373	12-10			
average gross(g)*	107.0875				
tare(g)	106.9635				
residue(g)	0.0740				

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)					

11-24-98 70°/30° 10AM
11-27-98 70°/10° 1PM
11-29-98 70°/65° 10AM
11-29-98 72°/60° 4PM

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

FRONT ACETONE:	date gross 1:		date gross 2:		
Sample #	32612	32613	32614		
sample ID	OSU East Cycle 1	OSU west Cycle 1	OSU Blank		
cont. #					
vol mark	✓	✓	✓		
(check if OK)					
volume(ml)	118 ml.	216 ml.	200 ml.		
gross1(g)	87.4397	106.1487	87.7749	11-27	
gross2(g)	87.4397	106.1477 106.1481 11-29	87.7746	11-29	
average gross(g)*	87.4397	106.1479	87.7748		
tare(g)	87.4380	106.1425	87.7749		
residue(g)	.0017	.0054	-.0001		

FAXED 11-30-98 12-14-98

BACK ACETONE:	date gross 1:		date gross 2:		
Sample #	32612	32613			
sample ID	OSU East Cycle 1	OSU west Cycle 1			
cont. #					
vol mark	✓	✓			
(check if OK)					
volume(ml)	195 ml.	235 ml.			
gross1(g)	107.1703	117.2001	11-29		
gross2(g)	107.1708	117.2004	11-29		
average gross(g)*	107.1706	117.2003			
tare(g)	106.9635	117.1602			
residue(g)	.2071	.0401			

IMPINGER WATER:	date gross 1:		date gross 2:		
Sample #			32614	32615	32616
sample ID			OSU Blank	OSU-E C1 R2	OSU-E C1 R4
cont. #					
vol mark			✓	✓	✓
(check if OK)					
volume(ml)			200 ml.	668 ml	830 ml
gross1(g)			165.2533	122.9526	124.8989 11-27
gross2(g)			165.2528	122.9530	124.8992 11-29
average gross(g)*			165.2531	122.9528	124.8991
tare(g)			165.2507	122.9506	124.8776
residue(g)			.0024	.0022	.0215

SAMPLE DATA: EPA RESIDUES

analyst:_____reviewer:_____
Job #_____ Identification: Willamette Und/OSU 1079

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

Sample #	32622	32623	32624	32625	32626	
sample ID						
cont. #						
volume(ml)	(150)	(150)	(150)	(150)	(150)	
gross1(g)	112.0153	111.0693	106.6970	105.9409	92.5093	11-27
gross2(g)	112.0158	111.0714	106.6983	105.9416	92.5096	11-29
		111.0715	106.6984	105.9418		11-29
average gross(g)*	112.0156	111.0715	106.6984	105.9417	92.5095	
tare(g)	112.0125	111.0686	106.6931	105.9390	92.5061	
residue(g)	.0031	.0029	.0053	.0027	.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 #_____ Identification: Willamette Ind/OSU - 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)					

FAX'D 11-30-98

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 #	32622	32623	32624	32625	32626
sample ID	OSU W C1 R5	OSU W C1 R7	OSU W C1 R9	OSU W C1 R11	OSU W C1 R13
cont. #					
vol mark (check if OK)					
volume(ml)	655 ml	480 ml	468 ml	466 ml	813 ml
gross1(g)	163.9758	165.7644	125.3254	122.0525	126.6866 11-27
gross2(g)	163.9760	165.7676 165.7681	125.3294 125.3296	122.0552 122.0557	126.6879 11-29 126.6877 11-29
average gross(g)*	163.9759	165.7679	125.3295	122.0555	126.6878
tare(g)	163.9751	165.7651	125.3283	122.0535	126.6864
residue(g)	.0008	.0028	.0012	.0020	.0014

SAMPLE DATA: EPA RESIDUES

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

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

Sample #	32617	32618	32619	32620	32621	
sample ID						
cont. #						
volume(ml)	(150)	(150)	(150)	(150)	(150)	
gross1(g)	107.7264	111.8567	106.3359	106.8250	107.2540	11-27
gross2(g)	107.7276	111.8593	106.3385	106.8266	107.2550	11-29
	107.7280	111.8596	106.3385	106.8269	107.2554	11-29
average gross(g)*	107.7278	111.8595	106.3385	106.8268	107.2552	
tare(g)	107.7264	111.8575	106.3319	106.8233	107.2505	
residue(g)	.0014	.0020	.0066	.0035	.0047	

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 #_____ Identification: Willamette Ind/OSCE 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)				

FAXED 11-30-98

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 #	32617	32618	32619	32620	32621
sample ID	OSU-E C1 R6	OSU-E C1 R8	OSU-E C1 R10	OSU-E C1 R12	OSU W C1 R3
cont. #					
vol mark (check if OK)					
volume(ml)	410ml	428ml	500ml	551ml	795ml
gross1(g)	164.0616	128.2608	164.1233	121.4877	150.2506 11-27
gross2(g)	164.0611	128.2611	164.1234	121.4882	150.2504 11-29
average gross(g)*	164.0614	128.2610	164.1234	121.4880	150.2505
tare(g)	164.0609	128.2609	164.1232	121.4873	150.2494
residue(g)	.0005	.0001	.0002	.0007	.0011

SAMPLE DATA: EPA RESIDUES

analyst:_____ reviewer:_____
Job #_____ Identification: Willamette Ind./OSU - 1079

DCM:	date gross 1:		date gross 2:			
Sample #			32614	32615	32616	
sample ID						
cont. #						
volume(ml)			(150)	(150)	(150)	
gross1(g)			103.2326	109.8721	96.0490	11-27
gross2(g)			103.2360	109.8747	96.0508	11-29
			103.2361	109.8752	96.0512	11-29
average gross(g)*			103.2361	109.8750	96.0510	
tare(g)			103.2362	109.8684	96.0451	
residue(g)			-.0001	.0066	.0059	

FILTERS:	date gross 1:			date gross 2:		
Sample #	32612	32612	32613	32613		
sample ID	OSU east cycle 1	OSU east cycle 1	OSU west cycle 1	OSU west cycle 1		
Filter #	98M-209	965-11	98M-169	~~965-10~~	965-16	
gross1(g)	.4172 11-23	.2521 11-23	.4162 11-23	.2021 11-24		
gross2(g)	.4168 11-24	.2520 11-24	.4161 11-24	.2020 11-27		
average gross(g)*	.4170	.2521	.4162	.2021		
tare(g)	.4146	.2506	.4129	.2034		
residue(g)	.0024	.0015	.0033	-0.0013		

Temperature day 1_____ Humidity day 1_____

Temperature day 2_____ Humidity day 2_____

NBS thermometer # _____

Balance service date:_____

Balance calibration data (certified weights):

Note: 32213 filter # was obscured - what appeared to be 965-10 was actually 965-16. Tare weight was corrected accordingly from 5/97 tare sheet

ANTECH

Analysis/Technology

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

December 15, 1998 — Identification: OSU - Kiln - Horizon #1079
Job # 9832904-21 — Date received: 11/25/98

Sample #	32904	32905	32906	32907	32908	32909
Identification:	OSU w hemlock cycle 2	OSU e hemlock cycle 1	OSU blanks	OSU w cycle 1 run 13	OSU w cycle 2 run 1	OSU w cycle 2 run 3
Front acetone:						
volume (mls)	104	148				
residue (g)	0.0086	0.0071				
Back acetone:						
volume (mls)	200	174				
residue (g)	0.0385	0.0485				
Impinger water:						
volume (mls)				360	80	1330
residue (g)				0.0023	0.0022	0.0046
DCM:						
residue (g):				0.0016	0.0019	0.0039
Filters:						
number	98M-175	98M-176	98M-291			
residue (g):	0.0078	0.0024	0.0002			
Filters:						
number	96S-16	96S-17				
residue (g)	0.0053	0.0015				

Respectfully submitted:
ANTECH

Diana Tracy
president

501 N.E. THOMPSON MILL ROAD
CORBETT, OREGON 97019
503/695-2135
FAX 503/695-2139

ANTECH

Analysis/Technology

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

December 15, 1998 — Identification: OSU - Kiln - Horizon #1079
Job # 9832904-21 — Date received: 11/25/98

Sample #	32910	32911	32912	32913	32914
Identification:	OSU w C2 R5	OSU w C2 R7	OSU w C2 R9	OSU w C2 R11	OSU w C2 R13
Impinger water:					
volume (mls)	675	625	430	745	1157
residue (g)	0.0043	0.0029	0.0027	0.0025	0.0045
DCM:					
residue (g):	0.0034	0.0056	-0.0002	0.0036	0.0069

Sample #	32915	32916	32917	32918	32919
Identification:	OSU e C2 R2	OSU e C2 R4	OSU e C2 R6	OSU e C2 R8	OSU e C2 R10
Impinger water:					
volume (mls)	955	11107	595	480	415
residue (g)	0.0033	0.0043	0.0031	0.0019	0.0026
DCM:					
residue (g):	0.0128	0.0118	0.0030	0.0016	0.0037

Sample #	32920	32921
Identification	OSU e C2 R12	OSU e C2 R14
Impinger water:		
volume(mls)	468	680
residue (g)	0.0015	0.0004
DCM:		
residue (g)	0.0020	0.0059

Respectfully submitted:
ANTECH

Diana Tracy
president

501 N.E. THOMPSON MILL ROAD
CORBETT, OREGON 97019
503/695-2135
FAX 503/695-2139

11-21-98 10°/61° 1 f
11-29-98 70°/60° 10A
11-29-98 72°/62° 4P
11-30-98 70°/60° 8AM
11-30-98 70°/59° 3:30 pm

SAMPLE DATA: EPA RESIDUES
analyst: _____ reviewer: _____
Job # 329 Identification: OSU - 1079

FRONT ACETONE:	date gross 1:		date gross 2:		
Sample #	32904	32905			
sample ID	OSU-W Cycle 2	OSU-E cycle 2			
cont. #					
vol mark	✓	✓			
(check if OK)					
volume(ml)	104ml.	148ml.			
gross1(g)	114.9690	88.5285	11-27		
gross2(g)	114.9691	88.5287	11-29		
average gross(g)*	114.9691	88.5286			
tare(g)	114.9605	88.5215			
residue(g)	.0086	.0071			

FAXED 11-30-98

BACK ACETONE:	date gross 1:		date gross 2:		
Sample #	32904	32905			
sample ID	OSU-W Cycle 2	OSU E cycle 2			
cont. #					
vol mark	✓	✓			
(check if OK)					
volume(ml)	200ml.	174ml.			
gross1(g)	87.6499	101.3451	11-29		
gross2(g)	87.6495 11-30	101.3451 11-29			
average gross(g)*	87.6497	101.3451			
tare(g)	87.6112	101.2966			
residue(g)	.0385	.0485			

IMPINGER WATER:	date gross 1:		date gross 2:		
Sample #			32907	32908	32909
sample ID			OSU-W cycle 1 R3	OSU-W cycle 2 R1	OSU-W cycle 2 R3
cont. #					
vol mark					
(check if OK)					
volume(ml)			360ml.	80ml.	1330ml
gross1(g)			124.1418	130.7149 11-29	121.8936 11-30
gross2(g)			124.1423	130.7164 11-29 130.7164	121.8940 11-30
average gross(g)*			124.1421	130.7164	121.8938
tare(g)			124.1398	130.7142	121.8892
residue(g)			.0023	.0022	.0046

SAMPLE DATA: EPA RESIDUES

analyst: ✓ reviewer: ____________
Job # 329 Identification: OSU-1079

DCM: date gross 1: ________ date gross 2: ________

Sample #			32907	32908	32909	
sample ID						
cont. #						
volume(ml)			(150)	(150)	(150)	
gross1(g)			98.3663	117.8303	102.4710	11-29
gross2(g)			98.3672	117.8313	102.4718	11-29
			98.3671	117.8311	102.4718	11-30
average gross(g)*			98.3672	117.8312	102.4718	
tare(g)			98.3656	117.8293	102.4679	
residue(g)			.0016	.0019	.0039	

FILTERS: date gross 1: ________ date gross 2: ________

Sample #	32904	32904	32905	32905	32906	
sample ID	OSU-W cycle 2	OSU W cycle 2	OSU-E cycle 2	OSU-E cycle 2	OSU Blank	
Filter #	98M-175	96S-16	98M-176	96S-17	98M-291	
gross1(g)	.4196	.2546 11-29	.4133	.2049	.4117	11-27
gross2(g)	.4192	.2542 11-30	.4131	.2049	.4115	11-29
average gross(g)*	.4194	.2544	.4132	0.2049	.4116	
tare(g)	0.4116 *	.2491	.4108	0.2034	.4114	
residue(g)	0.0078	.0053	.0024	0.0015	.0002	

Humidity day 1 ____________

Humidity day 2 ____________

...rtified weights):

sorry I can't read this filter #, & it isn't written on the tag.

There are no obvious chu. gone from ~~this~~ one, but the # is clear, so ~~this~~ is the right tare wt. weight from 5/97 tare sheet should have been used.

* - 98M-175 is marked off as "used" on our tare charts

SAMPLE DATA: EPA RESIDUES
analyst: [illegible] reviewer: _____
Job # 329 Identification: OSU 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)					

FAXED 11-30-98

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 #	32910	32911	32912	32913	32914
sample ID	OSU-W cycle 2 R5	OSU-W cycle 2 R7	OSU-W cycle 2 R9	OSU-W cycle 2 R11	OSU-W cycle 2 R13
cont. #					
vol mark (check if OK)					
volume(ml)	675 ml.	625 ml.	430 ml.	745 ml.	1157 ml
gross1(g)	120.2148	120.2373	120.5613	126.6816 11-29	123.1994 11-30
gross2(g)	120.2153	120.2374	120.5623 120.5624	126.6824 11-29 126.6825 11-30	123.1998 11-30
average gross(g)*	120.2151	120.2374	120.5624	126.6825	123.1996
tare(g)	120.2108	120.2345	120.5597	126.6800	123.1951
residue(g)	.0043	.0029	.0027	.0025	.0045

SAMPLE DATA: EPA RESIDUES

analyst: LW reviewer:_____
Job # 329 Identification: OSU 1079

DCM:	date gross 1:_____		date gross 2:_____			
Sample #	32910	32911	32912	32913	32914	
sample ID						
cont. #						
volume(ml)	(150)	(150)	(150)	(150)	(150)	
gross1(g)	114.8046	118.1716	102.1536	97.1976	92.3165	11-29
gross2(g)	114.8055	118.1720	102.1541	97.1995	92.3176	11-29
	114.8055			97.1990	92.3175	11-30
average gross(g)*	114.8055	118.1718	102.1539	97.1993	92.3176	
tare(g)	114.8021	118.1662	102.1541	97.1957	92.3107	
residue(g)	.0034	.0056	-.0002	.0036	.0069	

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: W reviewer: _____
Job # 329 Identification: OSU 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)					

FAXED 11-30-98

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 #	32915	32916	32917	32918	32919
sample ID	OSU-E cycle 2R2	OSU-E cycle 2R4	OSU-E cycle 2R6	OSU-E cycle 2R8	OSU-E cycle 2R10
cont. #					
vol mark					
(check if OK)					
volume(ml)	955ml	1107ml	595ml	480ml	415ml
gross1(g)	145.4037 11-30	122.0978 11-30	121.2275	124.1609	129.1181 11-29
gross2(g)	145.4034 11-30	122.0974 11-30	121.2283 121.2279 11-30	124.1614	129.1181 11-29
average gross(g)*	145.6036	122.0976	121.2281	124.1612	129.1181
tare(g)	145.6003	122.0933	121.2250	124.1593	129.1155
residue(g)	.0033	.0043	.0031	.0019	.0026

SAMPLE DATA: EPA RESIDUES

analyst: [illegible] reviewer: _____
Job # 329 Identification: OSU 1079

DCM:	date gross 1: _____		date gross 2: _____		
Sample #	32915	32916	32917	32918	32919
sample ID	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____
cont. #	_____	_____	_____	_____	_____
volume(ml)	(150)	(150)	(150)	(150)	(150)
gross1(g)	98.7603	97.7222	89.8867	89.0328	87.1788 11-29
gross2(g)	98.7607	97.7223 11-30	89.8874	89.0333	87.1788 11-29
			89.8873 11-30		
average gross(g)*	98.7606	97.7223	89.8874	89.0331	87.1788
tare(g)	98.7478	97.7105	89.8844	89.0315	87.1751
residue(g)	.0128	.0118	.0030	.0016	.0037

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 # 329 Identification: OSU 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)					

FAXED 11-30-98

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 #	32920	32921			
sample ID	OSU-E cycle 2 R12	OSU-E cycle 2 R14			
cont. #					
vol mark					
(check if OK)					
volume(ml)	468 ml.	680 ml.			
gross1(g)	125.6525	123.9780	11-29		
gross2(g)	125.6527	123.9787	11-29		
		123.9784	11-30		
average	125.6526	123.9786			
gross(g)*					
tare(g)	125.6511	123.9782			
residue(g)	.0015	.0004			

SAMPLE DATA: EPA RESIDUES

analyst: [illegible] reviewer: _____
Job # 329 Identification: OSW 1077

DCM:	date gross 1: _____		date gross 2: _____		
Sample #	32920	32921			
sample ID					
cont. #					
volume(ml)	(150)	(150)			
gross1(g)	105.4839	106.7680	11-29		
gross2(g)	105.4843	106.7683	11-29		
average gross(g)*	105.4841	106.7682			
tare(g)	105.4821	106.7623			
residue(g)	.0020	.0059			

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):

Dave Broderick

cycle 1 W sm
9650

cycle 2 W large
98M-175
↳ also appears to have been used already

NANCY

filter stuff

Smurfitt
penny got worksheet by accident

34306 C - KEG
15 - ND
664-6 ND
15 shield 1348865

Moisture Catch

Willamette Ind. - OSU
Wood Kiln - Hemlock
Corvallis, OR
EPA 4

16-Nov-98
drb/cdb
cyclrunw
mew

Impinger Contents			Run 1&3	Run 5	Run 7	Run 9	Run 11	Run 13
spg	Impinger, Contents & Condensate	g	2233	2157	2719	1939	2671	3196
g/ml	Impinger & H2O	g	1508	1444	2222	1524	2187	2198
1.010	H2O2	ml	0	0	0	0	0	0
1.080	2N NaOH	ml	0	0	0	0	0	0
0.844	80% IPA	ml	0	0	0	0	0	0
1.005	0.2N H2SO4	ml	0	0	0	0	0	0
0.998	H2O	ml	0	0	0	0	0	0
	Condensate	g	725.0	713.0	497.0	415.0	484.0	998.0
Silica Gel Impinger	Final weight	g	540	549	545	541	556	537
	Initial weight	g	520	540	524	523	540	522
	Gain	g	20.0	9.0	21.0	18.0	16.0	15.0
Total Moisture Gain	Condensate + Silica Gel gain	g	745.0	722.0	518.0	433.0	500.0	1013.0
Vlc	Net Moisture Gain	ml	746.3	723.3	518.9	433.8	500.9	1014.8

Moisture Catch

Willamette Ind. - OSU
Wood Kiln - Hemlock
Corvallis, OR
EPA 4

16-Nov-98
drb/cdb
cyclrune
mew

			Run 2	Run 4	Run 6	Run 8	Run 10	Run 12
Impinger Contents								
spg	Impinger, Contents & Condensate	g	1970	2724	2396	1761	1815	2319
g/ml	Impinger & H2O	g	1362	1897	1888	1384	1333	1871
1.010	H2O2	ml	0	0	0	0	0	0
1.080	2N NaOH	ml	0	0	0	0	0	0
0.844	80% IPA	ml	0	0	0	0	0	0
1.005	0.2N H2SO4	ml	0	0	0	0	0	0
0.998	H2O	ml	0	0	0	0	0	0
	Condensate	g	608.0	827.0	508.0	377.0	482.0	448.0
Silica Gel Impinger	Final weight	g	538	547	677	534	551	534
	Initial weight	g	520	538	520	524	534	520
	Gain	g	18.0	9.0	157.0	10.0	17.0	14.0
Total Moisture Gain	Condensate + Silica Gel gain	g	626.0	836.0	665.0	387.0	499.0	462.0
Vlc	Net Moisture Gain	ml	627.1	837.5	666.2	387.7	499.9	462.8

Moisture Catch

Willamette Ind. - OSU
Wood Kiln - Hemlock
Corvallis, OR
EPA 4

18-Nov-98
drb/cdb
cyc2runw
mew

			Run 1	Run 3	Run 5	Run 7	Run 9	Run 11	Run 13
Impinger Contents									
spg	Impinger, Contents & Condensate	g	1546	2753	2886	2812	1913	2948	3211
g/ml	Impinger & H2O	g	1505	1461	2131	2209	1465	2200	2198
1.010	H2O2	ml	0	0	0	0	0	0	0
1.080	2N NaOH	ml	0	0	0	0	0	0	0
0.844	80% IPA	ml	0	0	0	0	0	0	0
1.005	0.2N H2SO4	ml	0	0	0	0	0	0	0
0.998	H2O	ml	0	0	0	0	0	0	0
	Condensate	g	41.0	1292.0	755.0	603.0	448.0	748.0	1013.0
Silica Gel Impinger	Final weight	g	538	553	546	558	549	547	563
	Initial weight	g	527	538	522	539	530	518	536
	Gain	g	11.0	15.0	24.0	19.0	19.0	29.0	27.0
Total Moisture Gain	Condensate + Silica Gel gain	g	52.0	1307.0	779.0	622.0	467.0	777.0	1040.0
Vlc	Net Moisture Gain	ml	52.1	1309.4	780.4	623.1	467.8	778.4	1041.9

Moisture Catch

Willamette Ind. - OSU
Wood Kiln - Hemlock
Corvallis, OR
EPA 4

18-Nov-98
drb/cdb
cyc2rune
mew

			Run 2	Run 4	Run 6	Run 8	Run 10	Run 12	Run 14
Impinger Contents									
spg	Impinger, Contents & Condensate	g	2311	3038	2524	2411	2391	2451	2452
g/ml	Impinger & H2O	g	1356	1952	1920	1926	1927	1970	1980
1.010	H2O2	ml	0	0	0	0	0	0	0
1.080	2N NaOH	ml	0	0	0	0	0	0	0
0.844	80% IPA	ml	0	0	0	0	0	0	0
1.005	0.2N H2SO4	ml	0	0	0	0	0	0	0
0.998	H2O	ml	0	0	0	0	0	0	0
	Condensate	g	955.0	1086.0	604.0	485.0	464.0	481.0	472.0
Silica Gel Impinger	Final weight	g	547	549	557	556	543	562	543
	Initial weight	g	529	527	530	556	522	542	537
	Gain	g	18.0	22.0	27.0	0.0	21.0	20.0	6.0
Total Moisture Gain	Condensate + Silica Gel gain	g	973.0	1108.0	631.0	485.0	485.0	501.0	478.0
Vlc	Net Moisture Gain	ml	974.8	1110.0	632.1	485.9	485.9	501.9	478.9

Impinger Weight Gains in Grams

Date 11/16

Observers CDB, DAG

Cycle 1

Specie Hemlock

Run #	Stack (E or W)	#1 Init.	#1 Final	#2 Init.	#2 Final	#3 Init.	#3 Final	#4 Init. (w/o stem 520)	#4 Final	#5 Init.	#5 Final
1	W	823		685		716		~~520~~		~~0.0~~	
✓ 2	E	671	1043	691	927	599	empty	520	538		
3	W	823	376+1080	685	777	—	empty	520	540		
✓ 4	E	670	988	628	1044	599	692	538	547		
5	W	749	251+951	695	955	—	719	540	549		
✓ 6	E	656	243+893	633	660	599	600	520	677		
7	W	835	348+998	668	688	715	719	524	545		
✓ 8	E	724	251+836	660	674	598	empty	524	534		
9	W	837	1152	687	787	719	empty	523	541		
10	E	659	1015	674	800		empty	534	551		
11	W	907	1149	661	799		723	540	556		
12	E	652	1025	660	689	(599)	605	520	534		
13	W	827	1136	658	986	713	1074	522	537		
~~12~~ 13	E	~~664~~	~~575~~	~~689~~	~~588~~	~~600~~	~~600~~	~~[illegible]~~			
~~1~~	W										

Same

Same

~~Note~~

Impinger Weight Gains in Grams

Date 11/18/98

Observers CDB, DRB

Cycle 2

Specie Hemlock

711+1122

5I Gel w/o stem

Run #	Stack (E or W)	#1 Init.	#1 Final	#2 Init.	#2 Final	#3 Init.	#3 Final	#4 Init.	#4 Final	#5 Init.	#5 Final
		(Impinger Numbers)									
1	W	822	859	683	687	711	empty	527	538		
2	E	669	295+1010	687	1006	599	empty	529	547		
3	W	774	711+1122	687	920	711	empty	538	553		
4	E	668	344+949	685	207+932		606	527	549		
5	W	779	241+1112	641	94+719		720	522	546		
6	E	656	286+852	660	775	604	611	530	557		
7	W	789	284+1013	705	745	715	720	539	558		
8	E	642	274+815	680	717	604	605		556		
9	W	798	187+1039	667	687	720	720	530	549		
10	E	8658	899	664	799	605	608	~~532~~	543		
11	W	793	1065	687	995	720	888	518	547		
12	E	679	974	689	872	602	605	542	562		
13	W	816	806+1111	669	747	713	851	536	563		
14	E	682	997	696	853	602	602	537	545		

984

Sample Recovery

Cycle 1 West		Run 1&3	Run 5	Run 7	Run 9	Run 11	Run 13		Run 1&3	Run 5	Run 7	Run 9	Run 11	Run 13
Willamette Ind. -OSU														
Nov 16-18,1998				**Imp 1**							**Imp 2**			
Deionized H2O	ml	100.0						Deionized H2O	ml	100.0				
Deionized H2O	gm	99.8						Deionized H2O	gm	99.8				
Impinger & H2O	gm	823.0	749.0	835.0	837.0	807.0	827.0	Impinger & H2O	gm	685.0	695.0	668.0	688.0	661.0	658.0
Impinger & H2O & Sampling	gm	1456.0	1202.0	1316.0	1152.0	1149.0	1136.0	Impinger & H2O & Sampling	gm	777.0	955.0	688.0	787.0	799.0	986.0
Impinger	gm	723.2	723.2	723.2	723.2	723.2	723.2	Impinger	gm	585.2	585.2	585.2	585.2	585.2	585.2
Deionized	gm	99.8	3.5	0.8	0.2	0.0	0.0	Deionized	gm	99.82	57.15	12.80	12.80	4.81	1.64
Run No. 2	gm	633.0	22.3	5.2	1.0	0.2	0.0	Run No. 2	gm	92.00	52.67	11.80	11.80	4.43	1.51
Run No. 4	gm		453.0	105.8	20.3	4.0	1.0	Run No. 4	gm		260.00	58.23	58.23	21.88	7.45
Run No. 6	gm			481.0	92.4	18.1	4.4	Run No. 6	gm			20.00	20.00	7.51	2.56
Run No. 8	gm				315.0	61.6	15.0	Run No. 8	gm				99.00	37.19	12.67
Run No. 10	gm					342.0	83.4	Run No. 10	gm					138.00	47.00
Run No. 12	gm						309.0	Run No. 12	gm						328.00
Total H2O & Sample	gm	732.8	478.8	592.8	428.8	425.8	412.8	Total H2O & Sample	gm	191.8	369.8	102.8	201.8	213.8	400.8
Transfered	gm		25.8	111.8	113.8	83.8	103.8	From Transfer	gm		109.8	82.8	102.8	75.8	72.8
Transfered	%		5.4%	18.9%	26.5%	19.7%	25.1%	Transfered	%		29.7%	80.5%	50.9%	35.5%	18.2%
Deionized		13.6%	0.7%	0.1%	0.0%	0.0%	0.0%	Deionized		52.0%	15.5%	12.4%	6.3%	2.2%	0.4%
Run No. 2		86.4%	4.7%	0.9%	0.2%	0.0%	0.0%	Run No. 2		48.0%	14.2%	11.5%	5.8%	2.1%	0.4%
Run No. 4			94.6%	17.8%	4.7%	0.9%	0.2%	Run No. 4			70.3%	56.6%	28.9%	10.2%	1.9%
Run No. 6				81.1%	21.5%	4.2%	1.1%	Run No. 6				19.5%	9.9%	3.5%	0.6%
Run No. 8					73.5%	14.5%	3.6%	Run No. 8					49.1%	17.4%	3.2%
Run No. 10						80.3%	20.2%	Run No. 10						64.5%	11.7%
Run No. 12							74.9%	Run No. 12							81.8%
Lab Sample								Lab Sample							
Deionized	ml	96.5	2.7	0.7	0.1	0.0	0.0	Deionized	ml	42.7	44.4	0.0	8.0	3.2	1.6
Run No. 2	ml	611.8	17.1	4.2	0.8	0.1	0.0	Run No. 2	ml	39.4	40.9	0.0	7.4	2.9	1.5
Run No. 4	ml		347.8	85.6	16.4	3.0	1.0	Run No. 4	ml		202.1	0.0	36.4	14.5	7.5
Run No. 6	ml			389.3	74.4	13.7	4.4	Run No. 6	ml			0.0	12.5	5.0	2.6
Run No. 8	ml				253.9	46.6	15.0	Run No. 8	ml				61.9	24.6	12.7
Run No. 10	ml					259.1	83.5	Run No. 10	ml					91.2	47.1
Run No. 12	ml						309.5	Run No. 12	ml						328.6

Impinger No. 1	ml	708.3	367.7	479.8	345.6	322.6	413.6	
Impinger No. 2	ml	82.1	287.5	0.0	126.2	141.3	401.5	
Impinger No. 1 + No. 2		790	655	480	472	464	815	
Impinger No. 3	ml	0	0	4	0	4	362	
Impinger No. 1 + No. 2 + No. 3	ml	790	655	484	472	468	1177	4045.8
Lab Reported	ml	795	655	480	468	466	1173	4037.0
(diff)		-0.6%	0.0%	0.8%	0.8%	0.4%	0.3%	0.2%
Blank Correction Deionized H2O	ml	139.2	47.1	0.7	8.1	3.2	1.6	

Sample Recovery

Cycle 1 East - Hemlock Willamette-OSU Nov 16-20		Run No. 2	Run No. 4	Run No. 6	Run No. 8	Run No. 10	Run No. 12
				Imp 1			
Deionized H2O	ml	100.0					
Deionized H2O	gm	99.8					
Impinger & H2O	gm	671.0	670.0	656.0	724.0	659.0	652.0
Impinger & H2O & Sampling	gm	1043.0	988.0	1136.0	1087.0	1015.0	1025.0
Impinger	gm	571.2	571.2	571.2	571.2	571.2	571.2
Deionized	gm	99.8	20.9	4.3	1.2	0.2	0.0
Run No. 2	gm	372.0	77.9	15.9	4.3	0.7	0.1
Run No. 4	gm		318.0	64.7	17.5	3.0	0.5
Run No. 6	gm			480.0	129.9	22.1	4.0
Run No. 8	gm				363.0	61.8	11.3
Run No. 10	gm					356.0	64.8
Run No. 12	gm						373.0
Total H2O & Sample	gm	471.8	416.8	564.8	515.8	443.8	453.8
Transfered	gm		98.8	84.8	152.8	87.8	80.8
Transfered	%		23.7%	15.0%	29.6%	19.8%	17.8%
Deionized		21.2%	5.0%	0.8%	0.2%	0.0%	0.0%
Run No. 2		78.8%	18.7%	2.8%	0.8%	0.2%	0.0%
Run No. 4			76.3%	11.5%	3.4%	0.7%	0.1%
Run No. 6				85.0%	25.2%	5.0%	0.9%
Run No. 8					70.4%	13.9%	2.5%
Run No. 10						80.2%	14.3%
Run No. 12							82.2%
Lab Sample							
Deionized	ml	79.1	16.7	3.1	1.0	0.2	0.0
Run No. 2	ml	294.6	62.2	11.6	3.6	0.6	0.1
Run No. 4	ml		253.7	47.3	14.6	2.4	0.5
Run No. 6	ml			350.7	108.0	18.1	4.0
Run No. 8	ml				301.7	50.6	11.3
Run No. 10	ml					291.7	64.9
Run No. 12	ml						373.7

		Run No. 2	Run No. 4	Run No. 6	Run No. 8	Run No. 10	Run No. 12	
				Imp 2				
Deionized H2O	ml	100.0						
Deionized H2O	gm	99.8						
Impinger & H2O	gm	691.0	628.0	633.0	660.0	674.0	660.0	
Impinger & H2O & Sampling	gm	927.0	1044.0	660.0	674.0	800.0	689.0	
Impinger	gm	591.2	591.2	591.2	591.2	591.2	591.2	
Deionized	gm	99.82	10.95	1.01	1.01	1.01	0.33	
Run No. 2	gm	236.00	25.88	2.39	2.39	2.39	0.79	
Run No. 4	gm		416.00	38.42	38.42	38.42	12.66	
Run No. 6	gm			27.00	27.00	27.00	8.90	
Run No. 8	gm				14.00	14.00	4.61	
Run No. 10	gm					126.00	41.53	
Run No. 12	gm						29.00	
Total H2O & Sample	gm	335.8	452.8	68.8	82.8	208.8	97.8	
From Transfer	gm		36.8	41.8	68.8	82.8	68.8	
Transfered	%		8.1%	60.8%	83.1%	39.7%	70.4%	
Deionized		29.7%	2.4%	1.5%	1.2%	0.5%	0.3%	
Run No. 2		70.3%	5.7%	3.5%	2.9%	1.1%	0.8%	
Run No. 4			91.9%	55.8%	46.4%	18.4%	12.9%	
Run No. 6				39.2%	32.6%	12.9%	9.1%	
Run No. 8					16.9%	6.7%	4.7%	
Run No. 10						60.3%	42.5%	
Run No. 12							29.6%	
Lab Sample								
Deionized	ml	89.0	10.0	0.0	0.0	0.7	0.3	
Run No. 2	ml	210.5	23.5	0.0	0.0	1.6	0.8	
Run No. 4	ml		378.2	0.0	0.0	25.8	12.7	
Run No. 6	ml			0.0	-0.0	18.1	8.9	
Run No. 8	ml				0.0	9.4	4.6	
Run No. 10	ml					84.6	41.6	
Run No. 12	ml						29.1	

Impinger No. 1	ml	373.7	332.6	412.7	428.8	363.6	454.6	
Impinger No. 2	ml	299.5	411.7	0.0	-0.0	140.2	98.0	
Impinger No. 1 + No. 2		673.2	744.3	412.7	428.8	503.9	552.6	
Impinger No. 3	ml	0.0	93.2	0.0	0.0	0.0	5.0	
Impinger No. 1 + No. 2 + No. 3	ml	673.2	837.5	412.7	428.8	503.9	557.6	3413.7
Lab Reported	ml	668.0	830.0	410.0	428.0	500.0	551.0	3387.0
(diff)		0.8%	0.9%	0.7%	0.2%	0.8%	1.2%	0.8%
Blank Correction Deionized H2O	ml	168.1	26.6	3.1	1.0	0.8	0.4	

Sample Recovery

Willamette Ind. - OSU
Cycle No. 2 West - Hemlock
Nov 18-20, 1998

Imp 1

		Run No. 1	Run No. 3	Run No. 5	Run No. 7	Run No. 9	Run No. 11	Run No. 13
Deionized H2O	ml	100.0						
Deionized H2O	gm	99.8						
Impinger & H2O	gm	822.0	774.0	779.0	789.0	798.0	793.0	816.0
Impinger & H2O & Sampling	gm	859.0	1833.0	1353.0	1297.0	1226.0	1065.0	1617.0
Impinger	gm	722.2	722.2	722.2	722.2	722.2	722.2	722.2
Deionized	gm	99.8	37.8	1.9	0.2	0.0	0.0	0.0
Run No. 2	gm	37.0	14.0	0.7	0.1	0.0	0.0	0.0
Run No. 4	gm		1059.0	54.2	5.7	0.8	0.1	0.0
Run No. 6	gm			574.0	60.8	8.0	1.1	0.3
Run No. 8	gm				508.0	67.0	9.4	2.6
Run No. 10	gm					428.0	60.2	16.5
Run No. 12	gm						272.0	74.4
Run No. 14	gm							801.0
Total H2O & Sample	gm	136.8	1110.8	630.8	574.8	503.8	342.8	894.8
Transfered	gm		51.8	56.8	66.8	75.8	70.8	93.8
Transfered	%		4.7%	9.0%	11.6%	15.0%	20.7%	10.5%
Deionized		73.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%
Run No. 2		27.0%	1.3%	0.1%	0.0%	0.0%	0.0%	0.0%
Run No. 4			95.3%	8.6%	1.0%	0.2%	0.0%	0.0%
Run No. 6				91.0%	10.6%	1.6%	0.3%	0.0%
Run No. 8					88.4%	13.3%	2.7%	0.3%
Run No. 10						85.0%	17.5%	1.8%
Run No. 12							79.3%	8.3%
Run No. 14								89.5%
Lab Sample								
Deionized	ml	62.1	35.9	1.7	0.2	0.0	0.0	0.0
Run No. 2	ml	23.0	13.3	0.6	0.1	0.0	0.0	0.0
Run No. 4	ml		1006.6	48.5	5.0	0.7	0.1	0.0
Run No. 6	ml			514.1	52.9	6.9	0.8	0.3
Run No. 8	ml				441.8	57.7	6.9	2.6
Run No. 10	ml					368.5	43.8	16.5
Run No. 12	ml						197.9	74.6
Run No. 14	ml							802.4
Impinger No. 1	ml	85.2	1055.9	565.0	499.9	433.8	249.4	896.4
Impinger No. 2	ml	0.0	279.5	108.2	128.2	0.0	326.6	160.1
Impinger No. 1+2		85.2	1335.4	673.2	628.1	433.8	576.0	1056.5
Impinger No. 3		0.0	0.0	9.0	5.0	0.0	168.3	138.2
Impinger No. 1+2+3		85.2	1335.4	682.2	633.1	433.8	744.3	1194.8
Lab Reported		80.0	1330.0	675.0	625.0	430.0	745.0	1157.0
(diff)		6.4%	0.4%	1.1%	1.3%	0.9%	-0.1%	3.3%
Deionized H2O		62.1	118.8	9.8	5.7	0.0	2.9	0.8

Imp 2

		Run No. 1	Run No. 3	Run No. 5	Run No. 7	Run No. 9	Run No. 11	Run No. 13
Deionized H2O	ml	100.0						
Deionized H2O	gm	99.8						
Impinger & H2O	gm	683.0	687.0	641.0	705.0	667.0	687.0	669.0
Impinger & H2O & Sampling	gm	687.0	920.0	813.0	795.0	687.0	995.0	743.0
Impinger	gm	583.2	583.2	583.2	583.2	583.2	583.2	583.2
Deionized	gm	99.8	99.8	17.1	9.1	3.6	3.6	0.7
Run No. 2	gm	4.0	4.0	0.7	0.4	0.1	0.1	0.0
Run No. 4	gm		233.0	40.0	21.2	8.4	8.4	1.7
Run No. 6	gm			172.0	91.2	36.1	36.1	7.5
Run No. 8	gm				90.0	35.6	35.6	7.4
Run No. 10	gm					20.0	20.0	4.2
Run No. 12	gm						308.0	64.2
Run No. 14	gm							74.0
Total H2O & Sample	gm	103.8	336.8	229.8	211.8	103.8	411.8	159.8
Transfered	gm		103.8	57.8	121.8	83.8	103.8	85.8
Transfered	%		30.8%	25.2%	57.5%	80.7%	25.2%	53.7%
Deionized		96.1%	29.6%	7.5%	4.3%	3.5%	0.9%	0.5%
Run No. 2		3.9%	1.2%	0.3%	0.2%	0.1%	0.0%	0.0%
Run No. 4			69.2%	17.4%	10.0%	8.1%	2.0%	1.1%
Run No. 6				74.8%	43.0%	34.8%	8.8%	4.7%
Run No. 8					42.5%	34.3%	8.6%	4.6%
Run No. 10						19.3%	4.9%	2.6%
Run No. 12							74.8%	40.2%
Run No. 14								46.3%
Lab Sample								
Deionized	ml	0.0	82.8	8.1	5.5	0.0	2.9	0.8
Run No. 2	ml	0.0	3.3	0.3	0.2	0.0	0.1	0.0
Run No. 4	ml		193.3	18.8	12.8	0.0	6.7	1.8
Run No. 6	ml			81.0	55.2	0.0	28.6	7.5
Run No. 8	ml				54.5	0.0	28.2	7.4
Run No. 10	ml					0.0	15.9	4.2
Run No. 12	ml						244.2	64.3
Run No. 14	ml							74.1

Sample Recovery

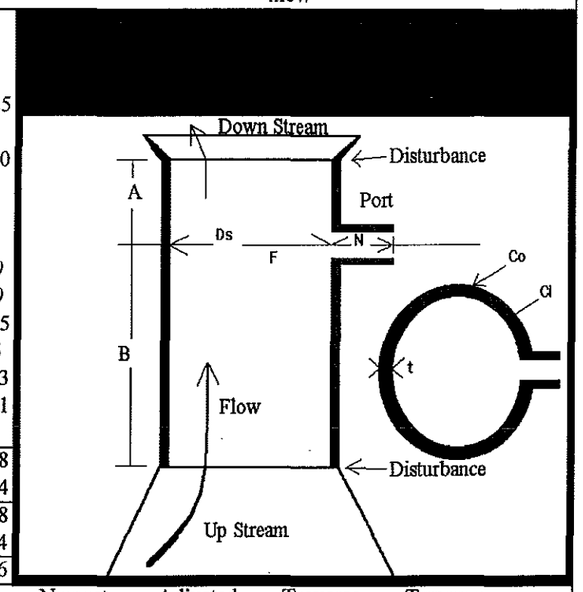
Willamette Ind. - OSU		Run No. 2	Run No. 4	Run No. 6	Run No. 8	Run No. 10	Run No. 12	Run No. 14
Cycle No. 2 East - Hemlock					**Imp 1**			
Nov 18-20, 1998								
Deionized H2O	ml	100.0						
Deionized H2O	gm	99.8						
Impinger & H2O	gm	669.0	668.0	656.0	642.0	658.0	679.0	682.0
Impinger & H2O & Sampling	gm	1305.0	1293.0	1138.0	1089.0	984.0	974.0	997.0
Impinger	gm	569.2	569.2	569.2	569.2	569.2	569.2	569.2
Deionized	gm	99.8	13.4	1.6	0.2	0.0	0.0	0.0
Run No. 2	gm	636.0	85.4	10.2	1.3	0.2	0.1	0.0
Run No. 4	gm		625.0	75.0	9.6	1.6	0.4	0.1
Run No. 6	gm			482.0	61.7	10.5	2.8	0.8
Run No. 8	gm				447.0	76.4	20.2	5.6
Run No. 10	gm					326.0	86.3	24.1
Run No. 12	gm						295.0	82.2
Run No. 14	gm							315.0
Total H2O & Sample	gm	735.8	723.8	568.8	519.8	414.8	404.8	427.8
Transfered	gm		98.8	86.8	72.8	88.8	109.8	112.8
Transfered	%		13.7%	15.3%	14.0%	21.4%	27.1%	26.4%
Deionized		13.6%	1.9%	0.3%	0.0%	0.0%	0.0%	0.0%
Run No. 2		86.4%	11.8%	1.8%	0.3%	0.1%	0.0%	0.0%
Run No. 4			86.3%	13.2%	1.8%	0.4%	0.1%	0.0%
Run No. 6				84.7%	11.9%	2.5%	0.7%	0.2%
Run No. 8					86.0%	18.4%	5.0%	1.3%
Run No. 10						78.6%	21.3%	5.6%
Run No. 12							72.9%	19.2%
Run No. 14								73.6%
Lab Sample								
Deionized	ml	86.6	11.8	1.4	0.2	0.0	0.0	0.0
Run No. 2	ml	551.6	75.3	8.9	1.1	0.2	0.0	0.0
Run No. 4	ml		551.0	65.5	8.0	1.2	0.3	0.1
Run No. 6	ml			421.0	51.3	7.8	2.0	0.8
Run No. 8	ml				371.3	56.3	14.6	5.6
Run No. 10	ml					240.1	62.4	24.1
Run No. 12	ml						213.2	82.4
Run No. 14	ml							315.6
Impinger No. 1	ml	638.1	638.1	496.9	431.8	305.5	292.5	428.6
Impinger No. 2	ml	321.6	479.8	95.2	53.1	110.2	176.3	266.3
Impinger No. 1+2		959.7	1118.0	592.0	484.9	415.7	468.8	694.9
Impinger No. 3		0.0	7.0	7.0	1.0	3.0	3.0	0.0
Impinger No. 1+2+3		959.7	1125.0	599.1	485.9	418.7	471.8	694.9
Lab Reported		955.0	1107.0	595.0	480.0	415.0	468.0	680.0
(diff)		0.5%	1.6%	0.7%	1.2%	0.9%	0.8%	2.2%
Deionized H2O		163.2	32.1	3.0	0.8	0.5	0.3	0.2

		Run No. 2	Run No. 4	Run No. 6	Run No. 8	Run No. 10	Run No. 12	Run No. 14	
					Imp 2				
Deionized H2O	ml	100.0							
Deionized H2O	gm	99.8							
Impinger & H2O	gm	687.0	685.0	660.0	680.0	664.0	689.0	696.0	
Impinger & H2O & Sampling	gm	1006.0	1139.0	775.0	717.0	799.0	872.0	853.0	
Impinger	gm	587.2	587.2	587.2	587.2	587.2	587.2	587.2	
Deionized	gm	99.8	23.3	3.1	1.5	0.9	0.4	0.2	
Run No. 2	gm	319.0	74.5	9.8	4.9	2.9	1.4	0.5	
Run No. 4	gm		454.0	59.9	29.6	17.5	8.4	3.2	
Run No. 6	gm			115.0	56.8	33.6	16.2	6.2	
Run No. 8	gm				37.0	21.9	10.5	4.0	
Run No. 10	gm					135.0	64.9	24.8	
Run No. 12	gm						183.0	69.9	
Run No. 14	gm							157.0	
Total H2O & Sample	gm	418.8	551.8	187.8	129.8	211.8	284.8	265.8	
Transfered	gm		97.8	72.8	92.8	76.8	101.8	108.8	
Transfered	%		17.7%	38.8%	71.5%	36.3%	35.7%	40.9%	
Deionized		23.8%	4.2%	1.6%	1.2%	0.4%	0.2%	0.1%	
Run No. 2		76.2%	13.5%	5.2%	3.7%	1.4%	0.5%	0.2%	
Run No. 4			82.3%	31.9%	22.8%	8.3%	3.0%	1.2%	
Run No. 6				61.2%	43.8%	15.9%	5.7%	2.3%	
Run No. 8					28.5%	10.3%	3.7%	1.5%	
Run No. 10						63.7%	22.8%	9.3%	
Run No. 12							64.3%	26.3%	
Run No. 14								59.1%	
Lab Sample									
Deionized	ml	76.6	20.3	1.6	0.6	0.5	0.3	0.2	
Run No. 2	ml	244.9	64.8	5.0	2.0	1.5	0.9	0.5	
Run No. 4	ml		394.8	30.4	12.1	9.1	5.2	3.2	
Run No. 6	ml			58.3	23.2	17.5	10.0	6.2	
Run No. 8	ml				15.1	11.4	6.5	4.0	
Run No. 10	ml					70.2	40.2	24.8	
Run No. 12	ml						113.3	70.0	
Run No. 14	ml							157.3	

Traverse Points

Willamette Ind. - OSU			18-Nov-98
Wood Kiln - Hemlock			drb/cdb
Corvallis, OR			cyc2runw
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	6

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	4.36%	14.3	0.6	0.625	0.625	0.625	0 5 / 8
2	14.64%	14.3	2.1	2.125	2.125	2.125	2 1 / 8
3	29.59%	14.3	4.2	4.250	4.250	4.250	4 1 / 4
4	70.41%	14.3	10.0	10.000	10.000	10.000	10
5	85.36%	14.3	12.2	12.125	12.125	12.125	12 1 / 8
6	95.64%	14.3	13.6	13.625	13.625	13.625	13 5 / 8

GASES

TGOC Emissions - Cycle No.1 Summary

Willamette Ind. - OSU
Cycle No. 1 Hemlock - TGOC (as Carbon)
Nov 16-18, 1998

Run ID	Start	End	Time Min	Qsd dscfm	Bws % Kiln	Bws % Analyzer	TGOC ppmv-C	TGOC lbm-C/hr	TGOC lbm-C
1	13:44	16:17	153	102.3	17.7%	9.3%	22.1	0.00423	0.01079
Calibration			16					0.00629	0.00168
2	16:33	20:21	228	28.0	39.7%	20.2%	146.4	0.00767	0.02913
Calibration			16					0.00875	0.00233
3	20:37	23:48	191	35.1	49.4%	24.9%	152.9	0.01004	0.03197
Calibration			27					0.01057	0.00476
4	00:15	02:42	147	50.6	37.3%	19.2%	119.0	0.01127	0.02760
Calibration			37					0.01214	0.00749
5	03:19	06:17	178	84.7	29.7%	14.8%	81.2	0.01286	0.03816
Calibration			17					0.01133	0.00321
6	06:34	09:24	170	79.6	28.5%	15.5%	65.3	0.00972	0.02753
Calibration			15					0.00981	0.00245
7	09:39	12:36	177	72.2	28.2%	15.8%	73.3	0.00990	0.02919
Calibration			14					0.01034	0.00241
8	12:50	16:24	214	74.7	24.2%	13.4%	76.6	0.01071	0.03819
Calibration			14					0.00889	0.00207
9	16:38	20:38	240	47.8	24.0%	13.2%	81.2	0.00727	0.02907
Calibration			13					0.00774	0.00168
10	20:51	00:23	212	65.9	23.6%	13.2%	67.2	0.00828	0.02926
Calibration			13					0.00749	0.00162
11	00:36	04:05	209	60.5	23.3%	12.8%	59.2	0.00669	0.02330
Calibration			17					0.00593	0.00168
12	04:22	08:26	244	57.0	26.8%	14.5%	49.5	0.00528	0.02145
Calibration			16					0.00423	0.00113
13	08:42	12:08	206	35.1	28.3%	15.3%	45.7	0.00300	0.01028
Calibration			14					0.00569	0.00133
14	12:22	16:03	221	56.3	43.1%	24.7%	77.9	0.00821	0.03024

	Interval min	Time Weighted Average Qsd dscfm	Bws % Kiln	Bws % Analyzer	ppmv-C	lbm-C/hr	lbm-C
Total Cycle Time	3,019					0.00815	0.41001
Total Actual Testing Time	2,790	59.2	30.3%	16.3%	80.0		
Percent Actual Testing Time of Cycle Time	92.4%						

Production 2,048 bft
0.20020 lbm-C/Mdbft (Corrected for calibration intervals)

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

TGOC Emissions - Cycle No.2 Summary

Oregon State - Willamette
Cycle No. 2 Hemlock
Nov 18-21, 1998

Run ID	Start	End	Time Min	Qsd dscfm	Bws % Kiln	Bws % Analyzer	TGOC ppmv-C	TGOC lbm-C/hr	TGOC lbm-C
1	20:05	23:02	177	176.77	14.4%	8.0%	18.2	0.00602	0.01776
Calibration			13					0.01000	0.00217
2	23:15	03:02	227	53.10	41.7%	23.0%	132.0	0.01311	0.04959
Calibration			21					0.01390	0.00487
3	03:23	04:47	84	56.39	48.5%	21.2%	152.2	0.01606	0.02248
Calibration			19					0.01595	0.00505
4	05:06	07:06	120	59.61	44.8%	20.0%	142.4	0.01587	0.03174
Calibration			16					0.01457	0.00388
5	07:22	10:59	217	69.14	36.6%	16.6%	107.1	0.01385	0.05007
Calibration			18					0.01406	0.00422
6	11:17	15:12	235	113.20	28.3%	13.4%	67.4	0.01426	0.05586
Calibration			19					0.01263	0.00400
7	15:31	19:11	220	79.53	24.7%	11.7%	73.2	0.01089	0.03994
Calibration			13					0.01226	0.00266
8	19:24	22:32	188	92.18	24.0%	10.9%	80.4	0.01386	0.04341
Calibration			45					0.01384	0.01038
9	23:17	03:01	224	68.98	22.5%	12.6%	107.1	0.01382	0.05160
Calibration			11					0.01276	0.00234
10	03:12	06:54	222	67.72	22.4%	12.3%	92.3	0.01169	0.04326
Calibration			13					0.01064	0.00230
11	07:07	10:51	224	63.57	23.0%	12.4%	80.7	0.00959	0.03581
Calibration			14					0.00965	0.00225
12	11:05	14:54	229	86.54	25.4%	15.9%	59.9	0.00970	0.03702
Calibration			18					*0.00958*	*0.00287*
13	*15:12*	*18:56*	224					*0.00958*	*0.03577*
Calibration			20					*0.00958*	*0.00319*
14	19:16	23:06	230	64.50	42.5%	20.2%	78.4	0.00947	0.03629
Calibration			19					0.00827	0.00262
15	23:25	01:12	107	49.86	43.2%	21.0%	61.1	0.00570	0.01017

Time Weighted Average

	Interval min	Qsd dscfm	Bws % Kiln	Bws % Analyzer	ppmv-C	lbm-C/hr	lbm-C
Total Cycle Time	3,187					0.01155	0.61356
Total Actual Testing Time	2,704	80.0	30.1%	15.2%	86.6		
Percent Actual Testing Time of Cycle Time	84.8%						

Production 2,048 bft
0.29959 lbm-C/Mdbft (Corrected for calibration intervals, and 15:12 to 18:56 Nov 20)

NOTES
[A] Emissions during calibration intrevals are time weighted averages of the previous and following tests.
[B] Run no. 13 had calibration problems and results not used. (15:12 to 18:56 Nov 20)

Cycle No. 1 TGOC Emissions (as Carbon)

Willamette Ind. - OSU																	16-Nov-98
Wood Kiln - Hemlock																	drb/cdb
Cycle No. 1																	tgoc
TGOC-EPA 25A																	mew
Cycle			1	1	1	1	1	1	1	1	1	1	1	1	1	1	Average
Run			1	2	3	4	5	6	7	8	9	10	11	12	13	14	Time Weigh
Side			West	East	West	East	West	East	West	East	West	East	West	East	West	East	
Date Tested			16-Nov	16-Nov	16-Nov	17-Nov	17-Nov	17-Nov	17-Nov	17-Nov	17-Nov	17-Nov	18-Nov	18-Nov	18-Nov	18-Nov	
System Calibration Time - Initial		Tci	13:35	16:30	20:33	00:10	03:13	06:32	09:37	12:48	16:34	20:48	00:34	04:19	08:39	12:20	
Test Time-Starting		Tts	13:44	16:33	20:37	00:15	03:19	06:34	09:39	12:50	16:38	20:51	00:36	04:22	08:42	12:22	
Test Time-Ending		Tte	16:17	20:21	23:48	02:42	06:17	09:24	12:36	16:24	20:38	00:23	04:05	08:26	12:08	16:03	
System Calibration Time - Final		Tcf	16:20	20:33	00:03	02:47	06:21	09:27	12:39	16:27	20:41	00:26	04:09	08:29	12:12	16:43	
Test Mid-point Time		Tx	15:00	18:27	22:12	01:28	04:48	07:59	11:07	14:37	18:38	22:37	02:20	06:24	10:25	14:12	
Time		min	153	228	191	147	178	170	177	214	240	212	209	244	206	221	
Volumetric Flow (interval average)	dscf/min	Qsd	*102.3*	28.0	35.1	50.6	84.7	79.6	72.2	74.7	47.8	65.9	60.5	57.0	35.1	56.3	
Oxygen	%	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	20.95	20.95	
Carbon Dioxide	%	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	0.03	0.03	
Moisture, Mole Fraction dry Gas (Kiln)		mfg	82.3%	60.3%	50.6%	62.7%	70.3%	71.5%	71.8%	75.8%	76.0%	76.4%	76.7%	73.2%	71.7%	56.9%	
Moisture (Kiln) (interval average)		bws	*17.7%*	39.7%	49.4%	37.3%	29.7%	28.5%	28.2%	24.2%	24.0%	23.6%	23.3%	26.8%	28.3%	43.1%	30.29%
Moisture (Analyzer)		bws	9.3%	20.2%	24.9%	19.2%	14.8%	15.5%	15.8%	13.4%	13.2%	13.2%	12.8%	14.5%	15.3%	24.7%	16.25%
Dilution	bws(analyzer)/bws(kiln)		52.6%	51.0%	50.5%	51.4%	49.9%	54.6%	56.2%	55.2%	54.8%	55.9%	54.9%	54.0%	54.0%	57.3%	
Total Gaseous Organic Concentration	**(TGOC)**	Span	1,000	1,000	1,000	1,000	100	100	100	100	100	100	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00														
Span Gas- Carbon Count Equivalent		K	3														
Cylinder Value - High Range calibration gas	ppmv		87.60	87.60	87.60	874.00	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Indicated average- Wet	ppmv-C3H8	Ciw	2.91	20.19	19.33	16.54	12.18	9.91	11.87	12.44	12.76	10.59	9.20	7.64	7.05	10.54	11.71
Span Gas Concentration- Equivalent	ppmv	Sc	87.60	87.60	87.60	874.00	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	
Zero Gas Concentration- Equivalent	ppmv	Zc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initial	ppmv	Ss	45.60	45.20	44.80	455.80	45.73	47.78	48.40	49.60	48.90	49.16	48.63	47.84	48.20	50.60	
System Calibration Response - Low Range gas - Initial	ppmv	Zs	-0.60	0.40	0.30	-0.30	0.23	-0.45	-0.47	-0.30	-0.35	-0.39	-0.60	-0.57	-0.85	-0.38	
System Calibration Response - Low Range gas - Final	ppmv	Ze	-0.60	0.30	-0.30	0.40	1.11	0.21	1.10	0.74	0.10	-0.18	0.10	0.60	1.01	-1.04	
System Calibration Response - High Range gas - Final	ppmv	Se	45.30	44.80	43.60	443.40	43.07	47.60	50.70	47.60	46.89	48.21	47.10	46.80	46.60	48.01	
Actual average - Wet (Corrected for Drift & Response)	ppmv-C3H8		6.68	38.92	38.26	32.05	23.06	18.38	20.56	22.12	23.51	19.44	17.20	14.11	12.90	19.56	21.97
Actual average - Dry (Corrected for Drift & Response)	ppmv-C3H8		7.37	48.79	50.97	39.67	27.07	21.76	24.43	25.54	27.08	22.40	19.73	16.50	15.23	25.97	26.67
Actual average - Dry	ppmv-C	Cgas	22.11	146.37	152.90	119.00	81.21	65.29	73.29	76.61	81.24	67.20	59.18	49.51	45.70	77.92	80.00
Mass Emissions	lbm-C / hr		0.0042	0.0077	0.0100	0.0113	0.0129	0.0097	0.0099	0.0107	0.0073	0.0083	0.0067	0.0053	0.0030	0.0082	0.0081
	lbm-C		0.0108	0.0292	0.0320	0.0276	0.0382	0.0275	0.0292	0.0382	0.0291	0.0293	0.0233	0.0215	0.0103	0.0302	
	gm-C		4.89	13.23	14.49	12.51	17.31	12.49	13.24	17.32	13.18	13.27	10.58	9.74	4.67	13.71	

Cycle No.2 TGOC Emissions (as Carbon)

Oregon State University
Wood Kiln - Hemlock

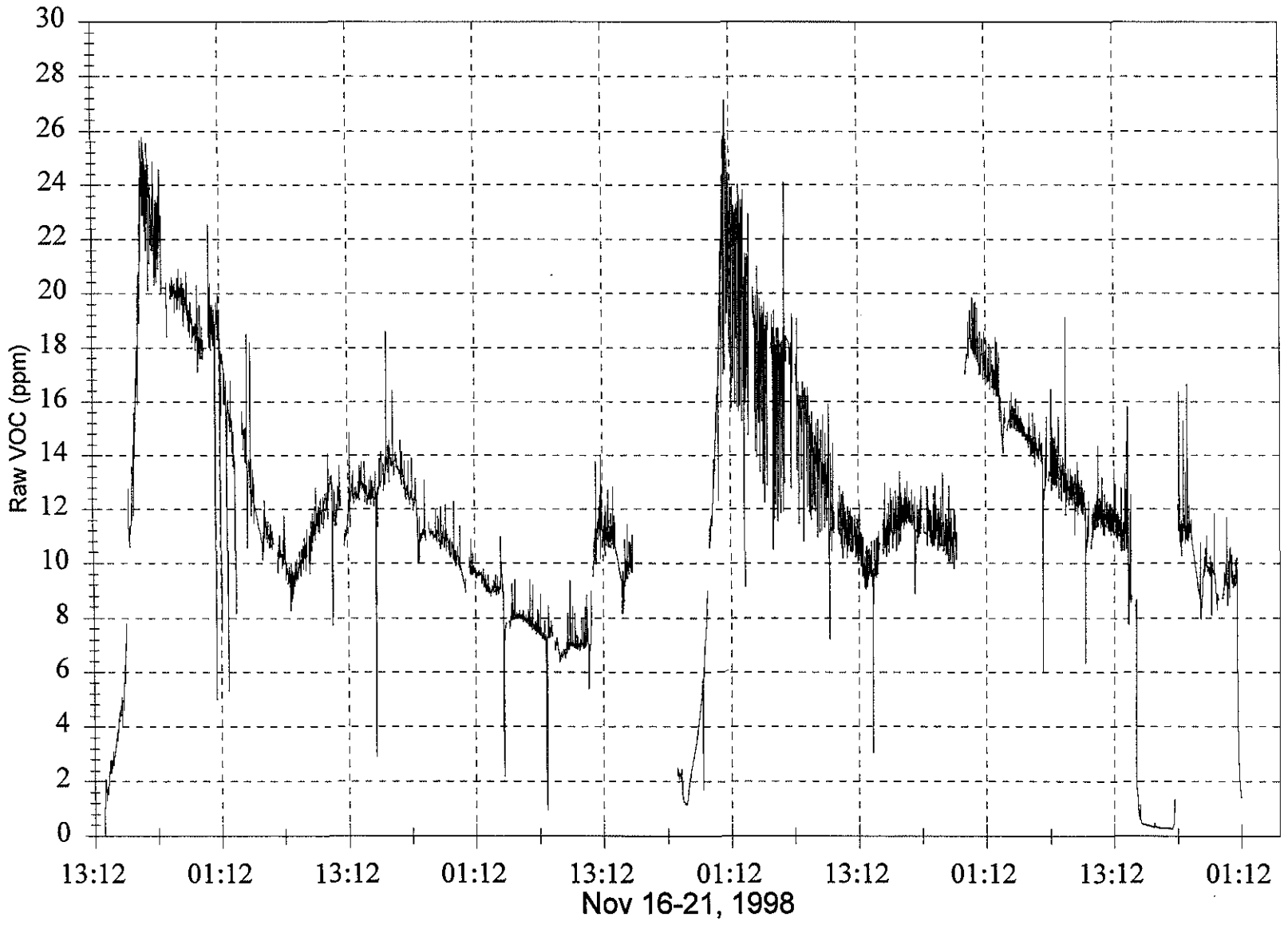
TGOC-EPA 25A

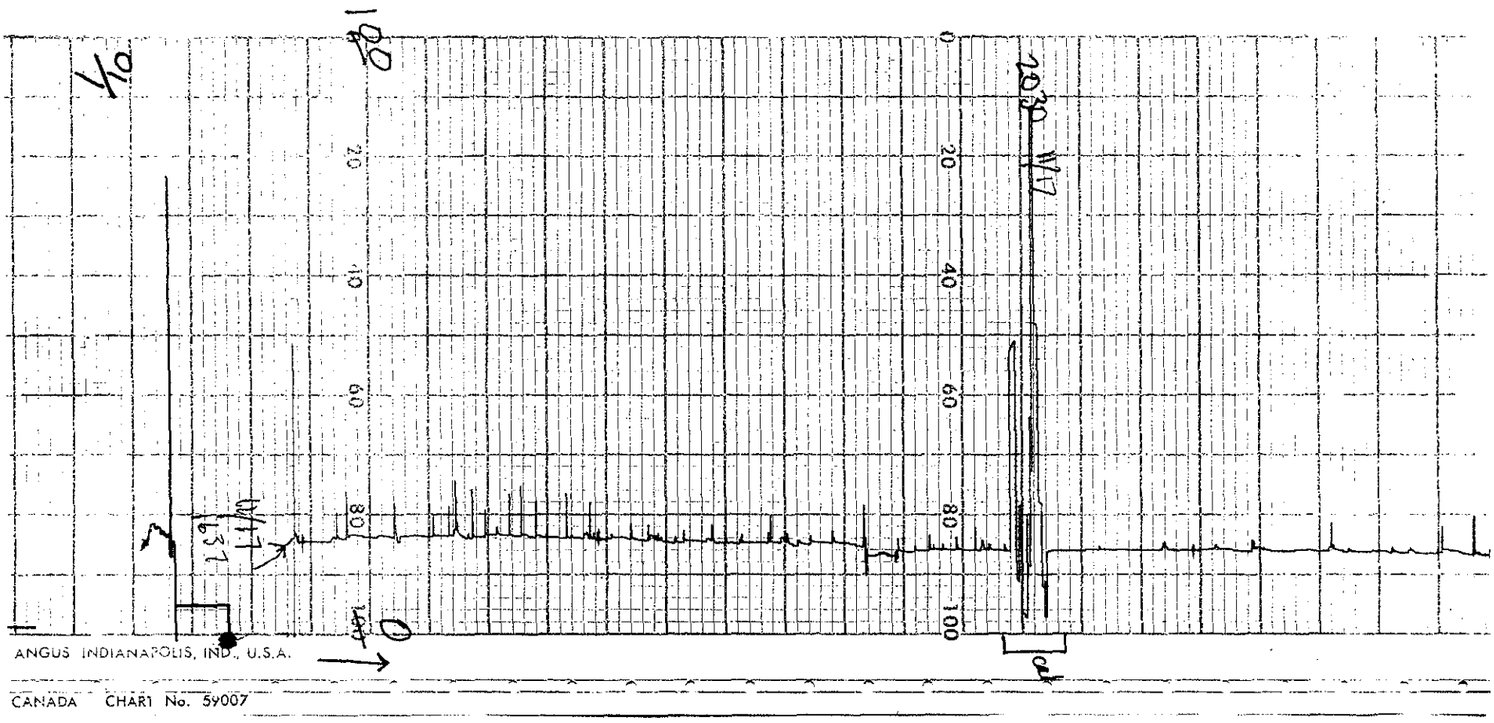
18-Nov-98
drb/cdb
tgoc2
mew

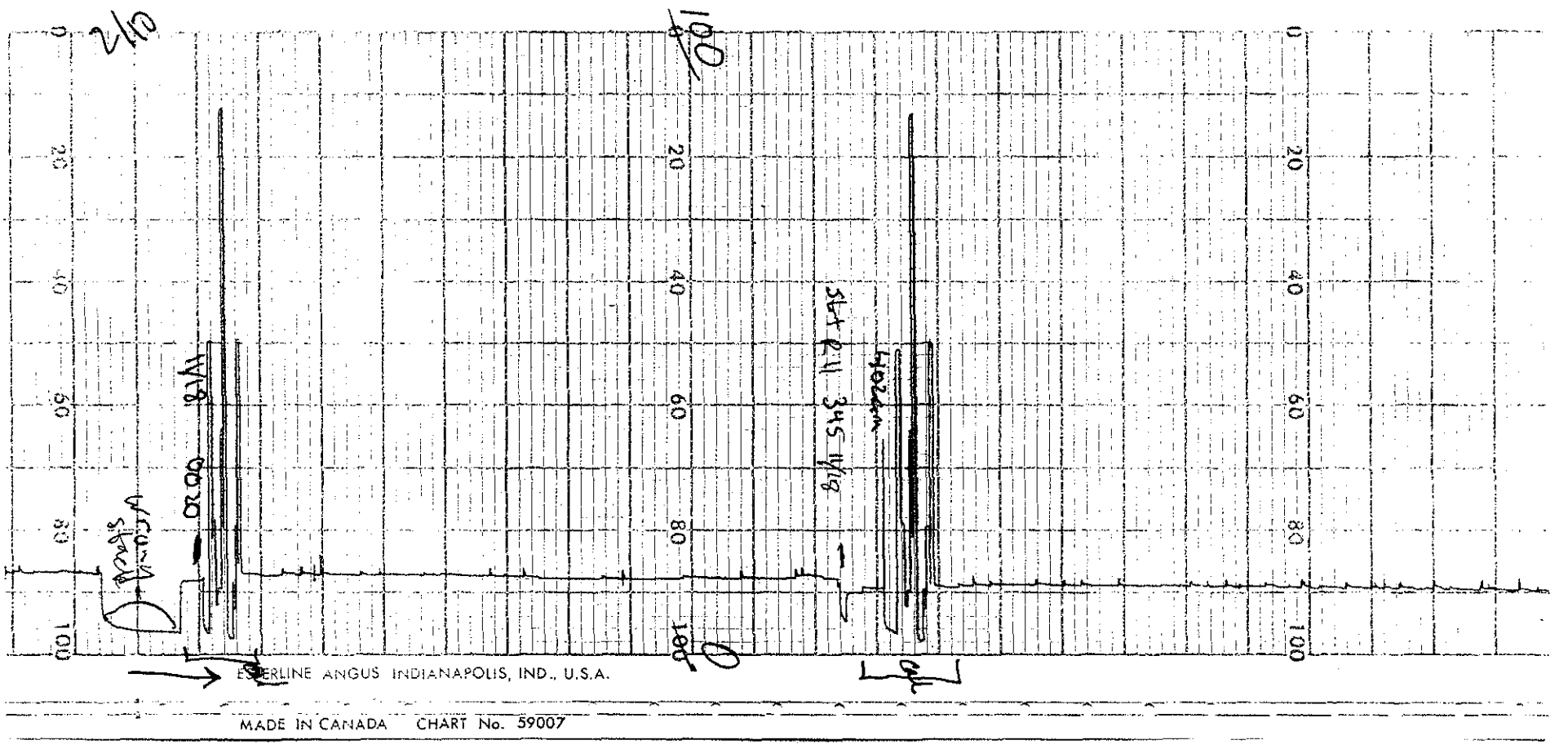
Cycle			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	Average
Run			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Time Weighted
Side			West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	
Date Tested			18-Nov	18-Nov	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov	20-Nov	20-Nov	20-Nov	20-Nov	20-Nov	20-Nov	
System Calibration Time - Initial		Tci	20:01	23:12	03:20	05:02	07:19	11:14	15:28	19:21	23:14	03:09	07:03	11:02	15:09	19:13	23:22	
Test Time-Starting		Tts	20:05	23:15	03:23	05:06	07:22	11:17	15:31	19:24	23:17	03:12	07:07	11:05	15:12	19:16	23:25	
Test Time-Ending		Tte	23:02	03:02	04:47	07:06	10:59	15:12	19:11	22:32	03:01	06:54	10:51	14:54	18:56	23:06	01:12	
System Calibration Time - Final		Tcf	23:04	03:08	04:54	07:14	11:03	15:15	19:14	23:06	03:05	06:58	10:54	14:58	18:59	23:09	01:15	
Test Mid-point Time		Tx	21:33	01:08	04:05	06:06	09:10	13:14	17:21	20:58	01:09	05:03	08:59	12:59	17:04	21:11	00:18	
Time		min	177	227	84	120	217	235	220	188	224	222	224	229	224	230	107	
Volumetric Flowrate (average during interval)	dscf/min	Qsd	176.8	53.1	56.4	59.6	69.1	113.2	79.5	92.2	69.0	67.7	63.6	86.5	54.4	64.5	49.9	
Oxygen	%	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	20.95	20.95	20.95	
Carbon Dioxide	%	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	0.03	0.03	0.03	
Moisture, Mole Fraction dry Gas (Kiln)		mfg	85.6%	58.3%	51.5%	55.2%	63.4%	71.7%	75.3%	76.0%	77.5%	77.6%	77.0%	74.7%	74.1%	57.6%	56.8%	
Moisture (Kiln) (average during interval)		bws	14.4%	41.7%	48.5%	44.8%	36.6%	28.3%	24.7%	24.0%	22.5%	22.4%	23.0%	25.4%	25.9%	42.5%	43.2%	29.27%
Moisture (Analyzer)		bws	8.0%	23.0%	21.2%	20.0%	16.6%	13.4%	11.7%	10.9%	12.6%	12.3%	12.4%	15.9%	10.6%	20.2%	21.0%	14.60%
Dilution	bws(analyzer)/bws(kiln)		55.5%	55.0%	43.6%	44.6%	45.3%	47.3%	47.4%	45.3%	55.9%	54.9%	54.0%	62.6%	41.1%	47.7%	48.6%	
Total Gaseous Organic Concentration	**(TGOC)**	Span	1,000	1,000	1,000	1,000	100	100	100	100	100	100	100	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00															
Span Gas- Carbon Count Equivalent		K	3															
Cylinder Value - High Range calibration gas	ppmv		87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	*87.60*	87.60	87.60	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*	0.00	0.00	
Indicated average- Wet	ppmv-C3H8	Ciw	3.46	19.48	17.96	17.18	14.00	10.52	11.44	11.10	17.16	14.57	12.74	11.39	*0.70*	10.21	8.10	12.75
Span Gas Concentration- Equivalent	ppmv	Sc	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	*87.60*	87.60	87.60	
Zero Gas Concentration- Equivalent	ppmv	Zc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.00*	0.00	0.00	
System Calibration Response - High Range gas - Initia	ppmv	Ss	49.18	49.27	40.03	41.40	40.13	42.60	43.04	41.41	49.16	48.63	47.84	58.63	*59.56*	47.12	42.92	
System Calibration Response - Low Range gas - Initia	ppmv	Zs	0.18	0.18	0.33	0.32	-0.05	0.00	0.63	0.48	-0.39	-0.60	-0.57	0.27	*0.02*	0.18	0.26	
System Calibration Response - Low Range gas - Final	ppmv	Ze	0.54	1.49	0.70	0.13	1.08	2.64	1.81	0.00	-0.18	0.10	0.60	1.49	*0.98*	0.35	0.29	
System Calibration Response - High Range gas - Final	ppmv	Se	48.79	48.80	37.28	37.14	40.30	42.90	42.50	38.10	48.21	47.10	46.80	52.73	*13.49*	36.98	42.81	
Actual average - Wet (Corrected for Drift & Response	ppmv-C3H8		5.58	33.89	40.01	37.96	29.77	19.44	21.54	23.88	31.21	26.98	23.55	16.81	*0.48*	20.85	16.10	24.22
Actual average - Dry (Corrected for Drift & Response	ppmv-C3H8		6.07	43.99	50.75	47.46	35.69	22.45	24.41	26.79	35.71	30.77	26.89	19.98		26.15	20.38	28.87
Actual average - Dry	ppmv-C	Cgas	18.21	131.98	152.25	142.37	107.07	67.36	73.22	80.36	107.13	92.30	80.67	59.93		78.44	61.14	86.61
Mass Emissions	lbm-C / hr		0.0060	0.0131	0.0161	0.0159	0.0138	0.0143	0.0109	0.0139	0.0138	0.0117	0.0096	0.0097		0.0095	0.0057	0.0116
	lbm-C		0.0178	0.0496	0.0225	0.0317	0.0501	0.0559	0.0399	0.0434	0.0516	0.0433	0.0358	0.0370		0.0363	0.0102	
	gm-C		8.05	22.49	10.20	14.40	22.71	25.34	18.11	19.69	23.40	19.62	16.24	16.79		16.46	4.61	

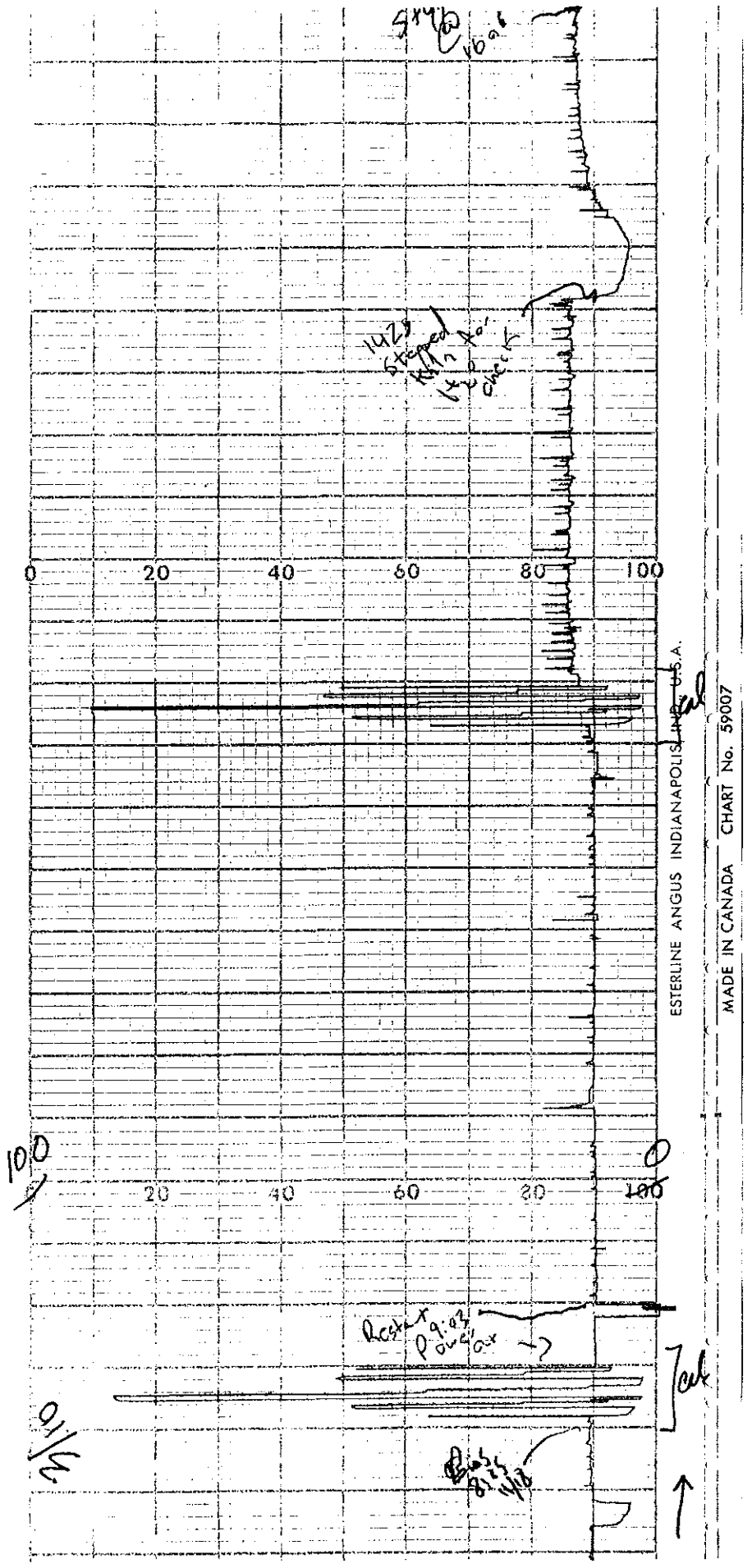
Hemlock

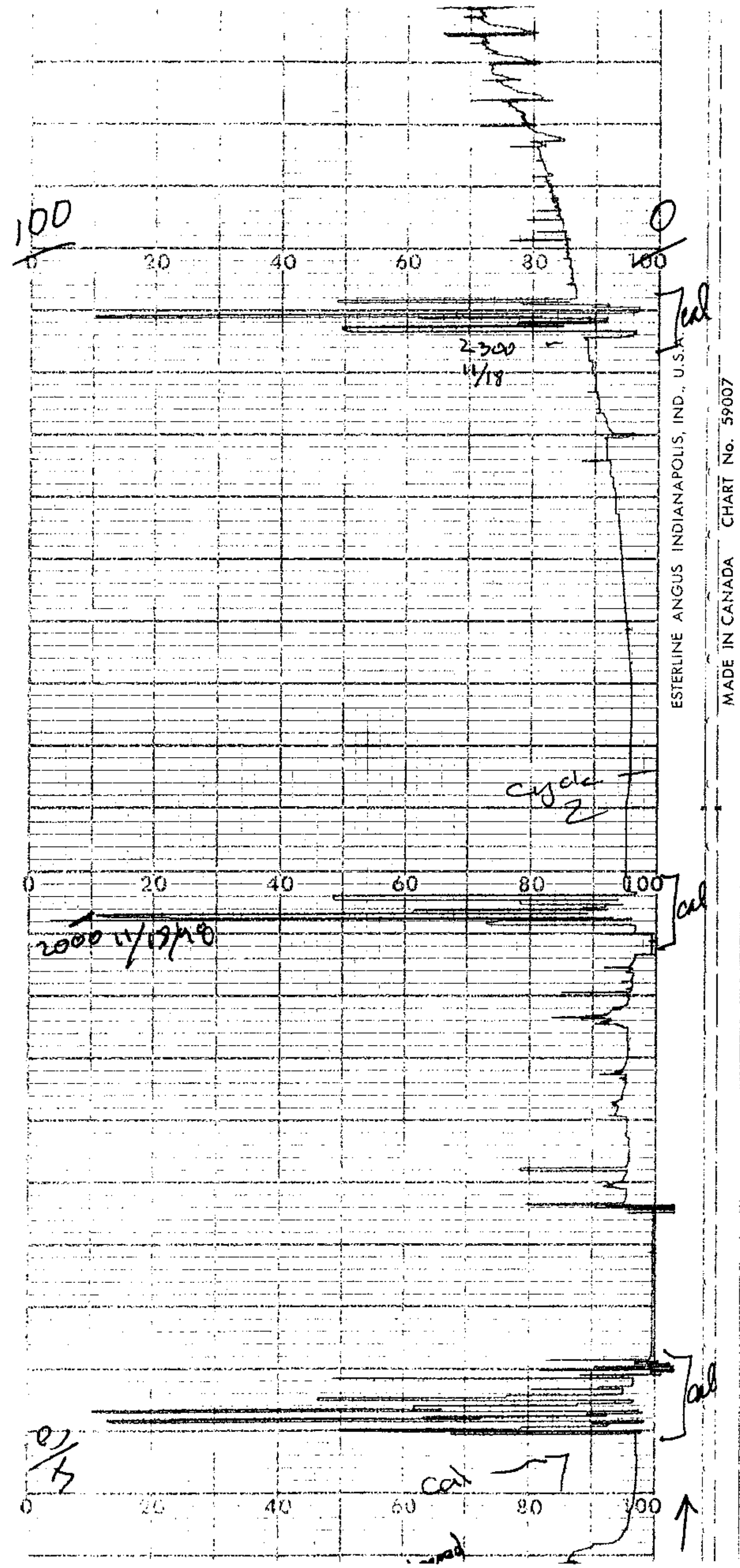
Cycle 1 & 2

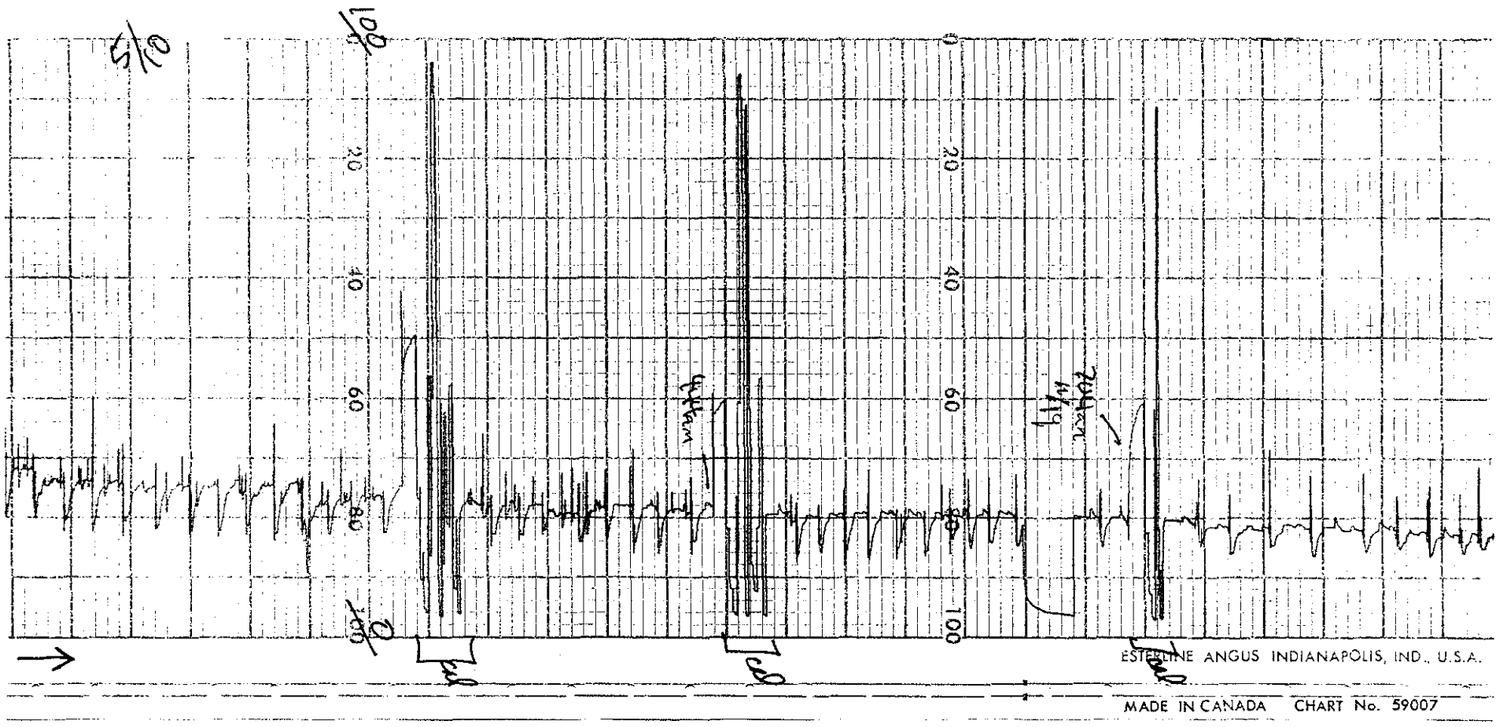


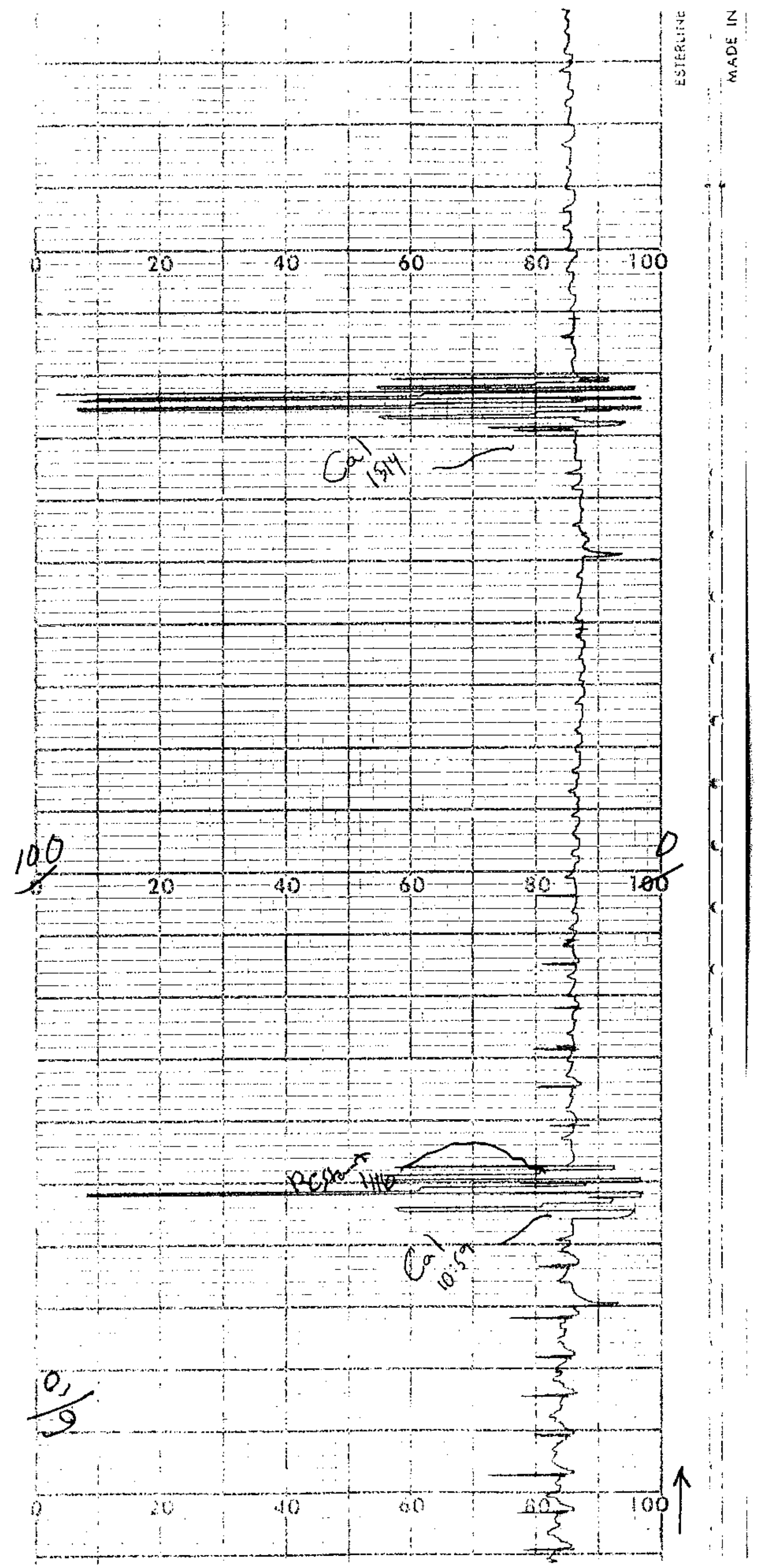

1/10
100
0
20
40
60
80
100
2030
W17
W17
631
ANGUS INDIANAPOLIS, IND., U.S.A.
CANADA CHART No. 59007


2/10
100
0
20
40
60
80
100
ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
MADE IN CANADA CHART No. 59007

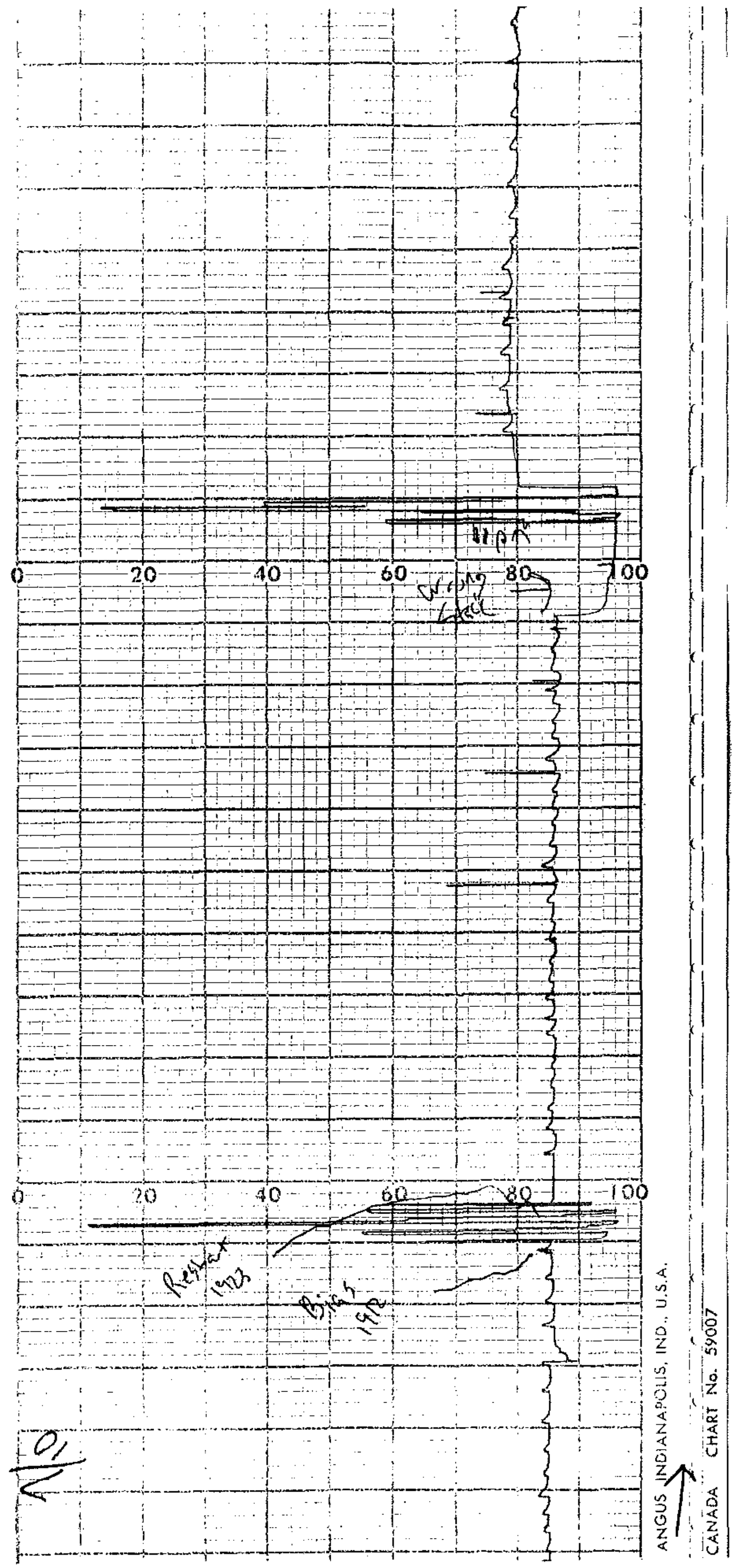

0
20
40
60
80
100
ESTERLINE ANGUS INDIANAPOLIS IND. U.S.A.
MADE IN CANADA CHART No. 59007

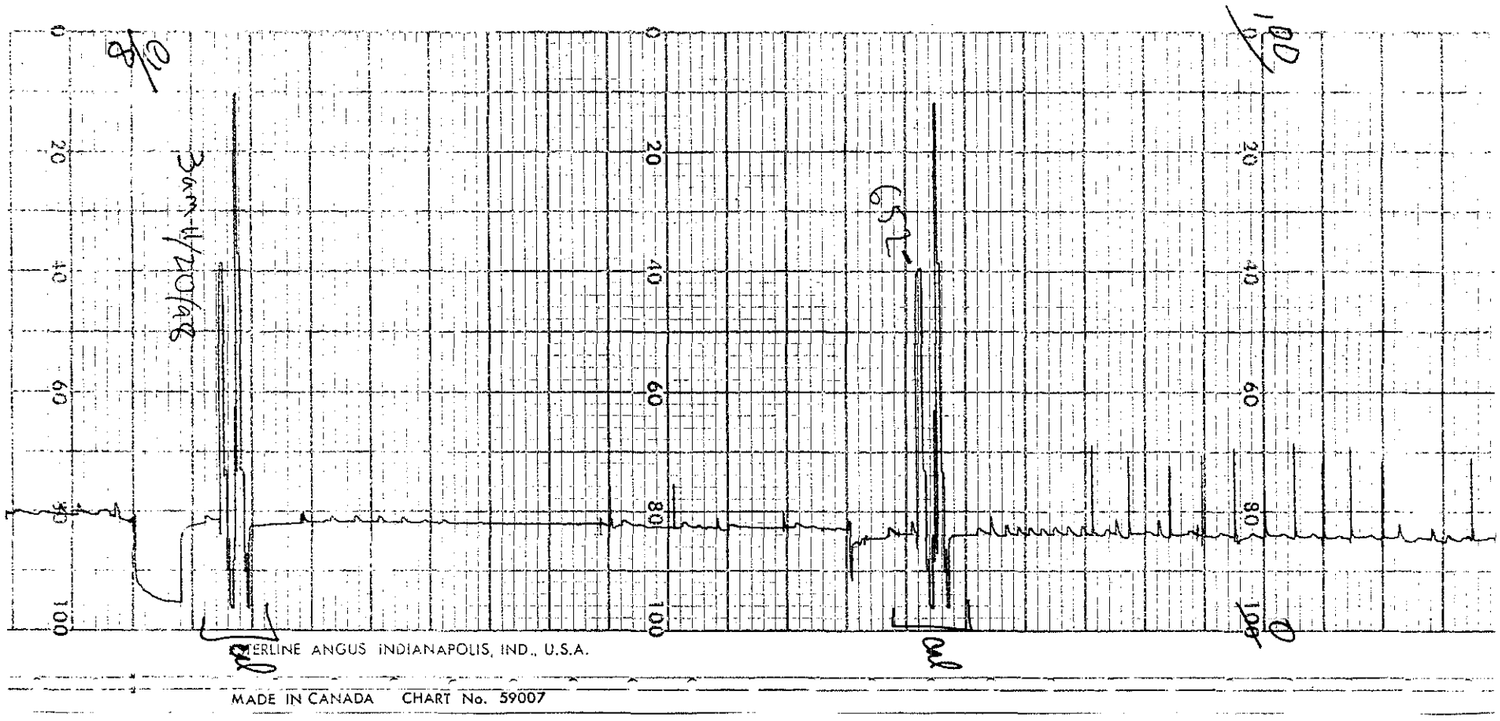

ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
MADE IN CANADA
CHART No. 59007
cal
cycle 2
cal
cal
cal

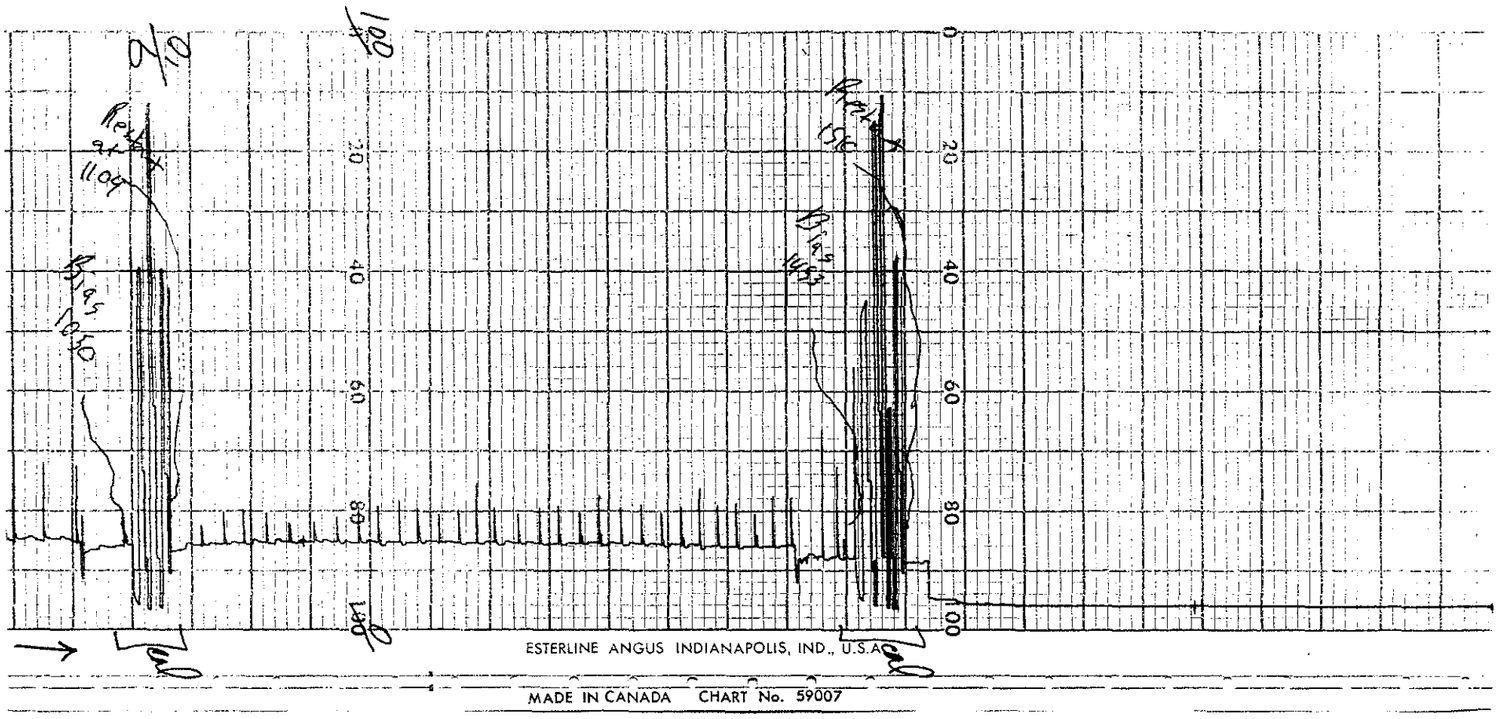

5/10
100/10
0
20
40
60
80
100
ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
MADE IN CANADA CHART No. 59007

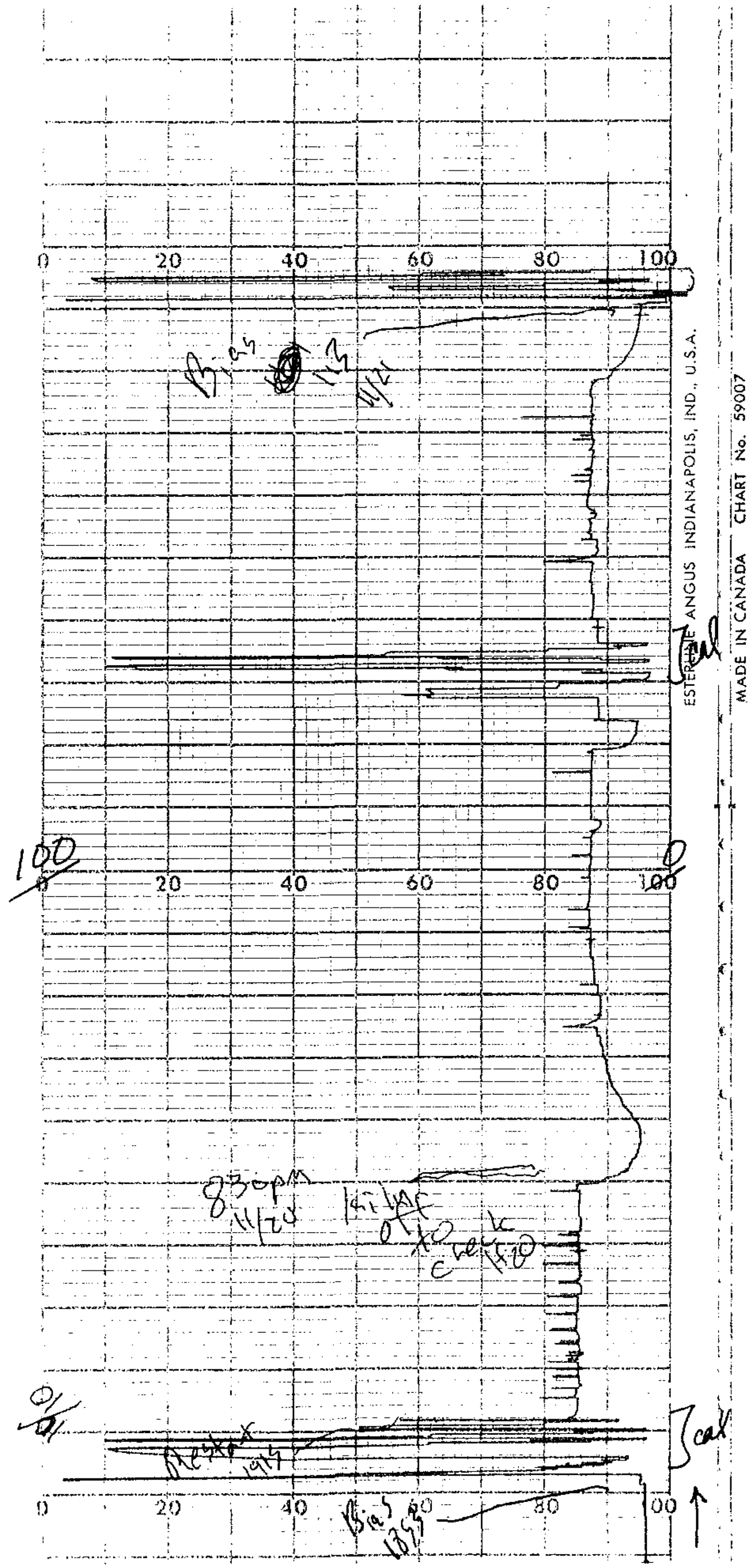


0
20
40
60
80
100
Cal
Cal
ESTERLINE
MADE IN


0
20
40
60
80
100
ANGUS INDIANAPOLIS, IND., U.S.A.
CANADA
CHART No. 59007


0
20
40
60
80
100
3 mm/20 sec
MADE IN CANADA CHART No. 59007


2/10
Relax at 11.04
Bias 10.50
Relax 15.06
Bias 14.53
0
20
40
60
80
100
ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
MADE IN CANADA CHART No. 59007


0 20 40 60 80 100
ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
MADE IN CANADA CHART No. 59007
cal
100
0
cal
Bias
Restart

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

03-17-98
#P4
OK

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

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

DATE: Ø3/12/98

CUSTOMER ORDER NUMBER: ØØ2Ø4

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC41152	Propane	87.6 ± Ø.9 ppm	SRM 1668b
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance, NIST Weight Report No. MMAP 232.Ø9/2Ø2491.

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

04 17 98

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENG01

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

DATE: 04/08/98
PO#2060

CUSTOMER ORDER NUMBER: 2060

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD	
CA03471	Propane Nitrogen	874 ± 9 ppm Balance	SRM 2646	#P8
CA03468	Propane Nitrogen	876 ± 9 ppm Balance	SRM 2646	#P9 OK
CA03459	Propane Nitrogen	517 ± 5 ppm Balance	SRM 2645	#P10
CA03454	Propane Nitrogen	17.49 ± 0.17 ppm Balance	SRM 1667B	#P11

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

Cycle No. 1 TGOC Flow Rate Determination

Cycle No. 1 Hemlock Nov 16-20, 1998					Average Flow Rate During Interval dscf/min	TGOC Run time during Flow Rate Interval min	Average Flow Rate During TGOC Interval dscf/min
TGOC	Start	1	16-Nov	13:44			
Particulate	Start	Run 01		14:20	147.17		
Particulate	End	Run 01		14:50	147.17	*30*	102.29
Particulate	Start	Run 02	16-Nov	15:59	27.50	18	
TGOC	End	1	16-Nov	16:17			
TGOC	Start	2	16-Nov	16:33			
Particulate	End	Run 02	16-Nov	19:48	27.50	195	28.04
Particulate	Start	Run 03	16-Nov	20:06	35.10	15	
TGOC	End	2	16-Nov	20:21			
TGOC	Start	3	16-Nov	20:37			
Particulate	End	Run 03	16-Nov	23:36	35.10		35.10
TGOC	End	3	16-Nov	23:48			
Particulate	Start	Run 04	16-Nov	23:48	50.60		
TGOC	Start	4	17-Nov	00:15			50.60
TGOC	End	4	17-Nov	02:42			
TGOC	Start	5	17-Nov	03:19			
Particulate	End	Run 04	16-Nov	03:44	50.60	25	84.72
Particulate	Start	Run 05	17-Nov	03:59	90.90	138	
TGOC	End	5	17-Nov	06:17			
TGOC	Start	6	17-Nov	06:34			
Particulate	End	Run 05	17-Nov	07:25	90.90	51	79.60
Particulate	Start	Run 06	17-Nov	08:12	71.60	72	
TGOC	End	6	17-Nov	09:24			
TGOC	Start	7	17-Nov	09:39			
Particulate	End	Run 06	17-Nov	11:44	71.60	125	72.20
Particulate	Start	Run 07	17-Nov	12:22	77.60	14	
TGOC	End	7	17-Nov	12:36			
TGOC	Start	8	17-Nov	12:50			
Particulate	End	Run 07	17-Nov	15:49	77.60	179	74.72
Particulate	Start	Run 08	17-Nov	16:07	44.40	17	
TGOC	End	8	17-Nov	16:24			
TGOC	Start	9	17-Nov	16:38			
Particulate	End	Run 08	17-Nov	19:44	44.40	186	47.82
Particulate	Start	Run 09	17-Nov	20:05	67.10	33	
TGOC	End	9	17-Nov	20:38			
TGOC	Start	10	17-Nov	20:51			
Particulate	End	Run 09	17-Nov	23:27	67.10	156	65.89
Particulate	Start	Run 10	17-Nov	23:48	60.50	35	
TGOC	End	10	17-Nov	00:23			
TGOC	Start	11	18-Nov	00:36			
Particulate	End	Run 10	17-Nov	03:29	60.50	173	60.48
Particulate	Start	Run 11	18-Nov	03:52	60.20	13	
TGOC	End	11	18-Nov	04:05			
TGOC	Start	12	18-Nov	04:22			
Particulate	End	Run 11	18-Nov	07:35	60.20	197	57.00
Particulate	Start	Run 12	18-Nov	07:58	34.50	28	
TGOC	End	12	18-Nov	08:26			
TGOC	Start	13	18-Nov	08:42			
Particulate	End	Run 12	18-Nov	11:50	34.50	188	35.06
Particulate	Start	Run 13	18-Nov	12:03	56.30	5	
TGOC	End	13	18-Nov	12:08			
TGOC	Start	14	18-Nov	12:22			56.30
TGOC	End	14	18-Nov	16:03			
Particulate	End	Run 13	18-Nov	16:06	56.30		

Cycle No.2 TGOC Flow Rate Determination

	Cycle No. 2 Hemlock Nov 16-20, 1998					Average Flow Rate During Interval dscf/min	TGOC Run time during Flow Rate Interval min	Average Flow Rate During TGOC Interval dscf/min
1	TGOC	Start	1		20:05			
1	*Particulate*	Start	Run 01	18-Nov	20:40	212.08		
1	*Particulate*	End	Run 01	18-Nov	22:15	212.08	95	176.77
1	Particulate	Start	Run 02	18-Nov	22:35	52.53	27	
1	TGOC	End	1		23:02			
2	TGOC	Start	2		23:15			
2	Particulate	End	Run 02	19-Nov	02:13	52.53	178	53.10
2	Particulate	Start	Run 03	19-Nov	02:31	56.39	31	
2	TGOC	End	2		03:02			
3	TGOC	Start	3		03:23			56.39
3	TGOC	End	3		04:47			
4	TGOC	Start	4		05:06			
4	Particulate	End	Run 03	19-Nov	06:15	56.39	69	59.61
4	Particulate	Start	Run 04	19-Nov	06:33	66.36	33	
4	TGOC	End	4		07:06			
5	TGOC	Start	5		07:22			
5	Particulate	End	Run 04	19-Nov	10:31	66.36	189	69.14
5	Particulate	Start	Run 05	19-Nov	10:48	116.89	11	
5	TGOC	End	5		10:59			
6	TGOC	Start	6		11:17			
6	Particulate	End	Run 05	19-Nov	14:32	116.89	195	113.20
6	Particulate	Start	Run 06	19-Nov	14:51	78.97	21	
6	TGOC	End	6		15:12			
7	TGOC	Start	7		15:31			
7	Particulate	End	Run 06	19-Nov	18:31	78.97	180	79.53
7	Particulate	Start	Run 07	20-Nov	19:03	92.18	8	
7	TGOC	End	7		19:11			
8	TGOC	Start	8		19:24			
8	Particulate	End	Run 07	20-Nov	22:19	92.18	175	92.18
8	TGOC	End	8		22:32			
	Particulate	Start	Run 08	20-Nov	22:39	69.08		
9	TGOC	Start	9		23:17			
9	Particulate	End	Run 08	20-Nov	02:14	69.08	177	68.98
9	Particulate	Start	Run 09	20-Nov	02:40	68.16	21	
9	TGOC	End	9		03:01			
10	TGOC	Start	10		03:12			
10	Particulate	End	Run 09	20-Nov	06:18	68.16	186	67.72
10	Particulate	Start	Run 10	20-Nov	06:37	62.90	17	
10	TGOC	End	10		06:54			
11	TGOC	Start	11		07:07			
11	Particulate	End	Run 10	20-Nov	10:33	62.90	206	63.57
11	Particulate	Start	Run 11	20-Nov	10:45	86.54	6	
11	TGOC	End	11		10:51			
12	TGOC	Start	12		11:05			
12	Particulate	End	Run 11	20-Nov	14:34	86.54	209	86.54
12	TGOC	End	12		14:54			
	Particulate	Start	Run 12	20-Nov	14:55	54.02		
13	TGOC	Start	13		15:12			
13	Particulate	End	Run 12	20-Nov	18:34	54.02	202	54.40
13	Particulate	Start	Run 13	20-Nov	18:49	65.42	7	
13	TGOC	End	13		18:56			
14	TGOC	Start	14		19:16			
14	Particulate	End	Run 13	20-Nov	22:33	65.42	197	64.53
14	Particulate	Start	Run 14	20-Nov	22:54	49.86	12	
14	TGOC	End	14		23:06			
15	TGOC	Start	15		23:25			
15	Particulate	End	Run 14	21-Nov	00:29	49.86	64	49.86
15	TGOC	End	15		01:12			

CALIBRATION DATA

file/date 9MB042298.WB1
Method EPA #5.3.2 & 5.6
Location Horizon Shop
Meter Box ID 9 — Pb= 30.30 (in Hg)
Meter ID None — Ta= 78 (oF)
calibrated cdb — LeakCheck
Assigned Van II — Date 08-12-98
Rate 0.00 in/min

	Old 07-16-98	New 08-12-98	Change (+/-)
Y=	1.00156	0.99062	-1.1%
dH@=	1.79308	1.82334	1.7%

999999999999	VAC	dH	Standard Meter	Net	Field Meter	Net	Standard Meter Tw	Tw	Field Meter Tdi	Tdo	To	Tm	Time t	Y	dH@	Allowable Tolerance Y 0.020	dH@ 0.20
	(in Hg)	(inH2O)	(ft3)	(ft3)	(ft3)	(ft3)	(oF)	(oR)	(oF)	(oF)	(oR)	(oR)	(min)				
Initial	15.0	4.00	855.1950	6.8050	259.7780	6.7400	78.0	539.0	78.0	78.0	538.0	539.0	6.100	0.99994	1.82693	0.009	0.00
Final			862.0000		266.5180		80.0		82.0	78.0							
Initial	16.0	3.00	862.1930	6.4390	266.7290	6.4260	80.0	540.0	81.0	78.0	538.5	541.0	6.667	0.99662	1.83302	0.006	0.01
Final			868.6320		273.1550		80.0		86.0	79.0							
Initial	17.5	2.00	868.7670	6.1270	273.3070	6.1820	80.0	540.5	84.0	79.0	539.5	543.0	7.850	0.99088	1.87127	0.000	0.05
Final			874.8940		279.4890		81.0		89.0	80.0							
Initial	19.5	1.00	874.9980	6.0510	279.5770	6.1750	81.0	540.5	87.0	80.0	541.0	544.5	10.833	0.98478	1.82191	0.006	0.00
Final			881.0490		285.7520		80.0		89.0	82.0							
Initial	21.0	0.50	881.1280	6.2060	285.8180	6.3660	81.0	541.0	87.0	82.0	542.5	545.0	15.467	0.98088	1.76359	0.010	0.06
Final			887.3340		292.1840		81.0		88.0	83.0							
														0.99062	1.82334	0.006	0.02

file/date 9MB042298.WB1
Method EPA #5.3.2 & 5.6
Location Horizon Shop
Meter Box ID 9 — Pb= 30.16 (in Hg)
Meter ID None — Ta= 61 (oF)
calibrated kds — LeakCheck
Assigned Van II — Date 11-24-98
Rate 0.00 in/min

	Old 08-12-98	New 11-24-98	Change (+/-)
Y=	0.99062	1.02434	3.4%
dH@=	1.82334	1.68514	-7.6%

999999999999	VAC	dH	Standard Meter	Net	Field Meter	Net	Standard Meter Tw	Tw	Field Meter Tdi	Tdo	To	Tm	Time t	Y	dH@	Allowable Tolerance Y 0.020	dH@ 0.20
	(in Hg)	(inH2O)	(ft3)	(ft3)	(ft3)	(ft3)	(oF)	(oR)	(oF)	(oF)	(oR)	(oR)	(min)				
Initial	12.8	4.00	401.3870	6.1330	230.5150	5.9730	61.0	521.0	61.0	60.0	520.0	522.5	5.360	1.01984	1.67872	0.004	0.01
Final			407.5200		236.4880		61.0		69.0	60.0							
Initial	12.6	3.00	408.3140	6.0680	237.2530	5.9410	61.0	521.0	68.0	61.0	521.5	527.0	6.210	1.02567	1.72146	0.001	0.04
Final			414.3820		243.1940		61.0		77.0	62.0							
Initial	13.5	2.00	414.9650	6.0940	243.7680	6.0260	61.0	521.0	73.0	62.0	522.5	529.5	7.500	1.02282	1.65653	0.002	0.03
Final			421.0590		249.7940		61.0		80.0	63.0							
Initial	17.1	1.00	421.5590	6.1960	250.2890	6.1140	61.0	521.0	73.0	63.0	523.5	529.0	11.000	1.02648	1.72022	0.002	0.04
Final			427.7550		256.4030		61.0		76.0	64.0							
Initial	12.2	0.50	428.2630	6.2020	256.9180	6.1450	62.0	522.0	74.0	64.0	524.5	531.8	15.230	1.02688	1.64879	0.003	0.04
Final			434.4650		263.0630		62.0		84.0	65.0							
														1.02434	1.68514	0.002	0.03

Source Test Control Box Calibrations

file/date 6MB9709.WB1
Method EPA #5.3.2 & 5.6
Location Horizon Shop
Meter Box ID 6
Meter ID 3624292
calibrated cdb
Assigned

Std M #2
Pb= 29.80 (in Hg)
Ta= 75 (oF)
LeakCheck
Date 09-28-98
Rate 0.00 in/min

	Old	New	Change
	08-03-98	09-28-98	(+/-)
Y=	0.99402	0.99086	-0.3%
dH@=	1.69107	1.69025	-0.0%

666666666666 666666666666 666666666666 666666666666	VAC (in Hg)	dH (inH2O)	Standard Meter (ft3)	Net (ft3)	Field Meter (ft3)	Net (ft3)	Standard Tw (oF)	Meter Tw (oR)	Field Tdi (oF)	Meter Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Allowable Tolerance Y 0.020	dH@ 0.20
Initial	19.0	4.00	115.9830	6.1110	945.7140	6.0900	75.0	535.0	75.0	74.0	534.0	535.0	5.267	0.99364	1.70437	0.003	0.01
Final			122.0940		951.8040		75.0		77.0	74.0							
Initial	21.0	3.00	122.3970	7.4430	952.1210	7.4680	76.0	536.0	77.0	75.0	535.5	537.3	7.450	0.99164	1.72583	0.001	0.04
Final			129.8400		959.5890		76.0		81.0	76.0							
Initial	23.0	2.00	129.9730	6.9850	959.7240	7.0580	75.0	535.5	80.0	76.0	537.0	539.5	8.617	0.99215	1.73944	0.001	0.05
Final			136.9580		966.7820		76.0		84.0	78.0							
Initial	25.0	1.00	137.0830	8.0580	966.9130	8.2080	76.0	536.5	82.0	78.0	539.0	541.3	13.767	0.98798	1.66818	0.003	0.02
Final			145.1410		975.1210		77.0		85.0	80.0							
Initial	25.0	0.50	145.2450	11.0970	975.2200	11.3590	77.0	537.0	84.0	80.0	542.0	544.3	26.417	0.98890	1.61344	0.002	0.08
Final			156.3420		986.5790		77.0		89.0	84.0							
														0.99086	1.69025	0.002	0.04

Method EPA #5.3.2 & 5.6
Location Horizon Shop
Meter Box ID 6
Meter ID 3624292
calibrated kds
Assigned

Std M #2
Pb= 30.16 (in Hg)
Ta= 61 (oF)
LeakCheck
Date 11-24-98
Rate 0.00 in/min

	Old	New	Change
	09-28-98	11-24-98	(+/-)
Y=	0.99086	0.97776	-1.3%
dH@=	1.69025	1.64545	-2.7%

666666666666 666666666666 666666666666 666666666666	VAC (in Hg)	dH (inH2O)	Standard Meter (ft3)	Net (ft3)	Field Meter (ft3)	Net (ft3)	Standard Tw (oF)	Meter Tw (oR)	Field Tdi (oF)	Meter Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Allowable Tolerance Y 0.020	dH@ 0.20
Initial	15.7	4.00	363.5200	6.0100	489.1860	6.0300	61.0	521.0	60.0	60.0	520.0	520.3	5.280	0.98564	1.70422	0.008	0.06
Final			369.5300		495.2160		61.0		61.0	60.0							
Initial	12.5	3.00	370.0020	6.0000	495.7070	6.0390	63.0	524.0	61.0	60.0	520.5	521.3	6.050	0.98115	1.70155	0.003	0.06
Final			376.0020		501.7460		65.0		63.0	61.0							
Initial	14.0	2.00	377.0030	6.0000	502.7530	6.0810	66.0	526.0	63.0	61.0	521.0	522.5	7.450	0.97536	1.73160	0.002	0.09
Final			383.0030		508.8340		66.0		65.0	61.0							
Initial	16.0	1.00	383.4020	6.2010	509.2510	6.3120	65.0	525.5	65.0	62.0	522.5	524.0	10.500	0.97723	1.60246	0.001	0.04
Final			389.6030		515.5630		66.0		66.0	63.0							
Initial	17.5	0.50	390.2680	6.3710	516.2520	6.5360	68.0	528.5	66.0	64.0	525.0	526.3	14.650	0.96942	1.48742	0.008	0.16
Final			396.6390		522.7880		69.0		69.0	66.0							
														0.97776	1.64545	0.005	0.08

Pitot Calibration Calculations

Date 17-Sep-98 Pb= 29.92 In Hg cdb
File pi98317 Ts= 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	0.80899	0.00511	0.80899	0.0%
ss3-5	8/27/98	0.79600	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	0.79684	0.8%
ss4-3	8/27/98	0.80025	0.00404	0.80350	-0.4%
ss4-4	8/27/98	0.79877	0.00478	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	0.80899	0.00511
Pass	0.880	1.300	0.81453	0.00754		
3/20/98	0.570	0.880	0.79677	0.01022		
cdb	0.360	0.540	0.80833	0.00134		
ss3-5	1.250	1.950	0.79263	0.00337	0.79600	0.00284
Pass	1.000	1.525	0.80188	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	0.81482	0.01195		
8/27/98	0.390	0.600	0.79816	0.00471		
cdb	0.368	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	0.79636	0.00390		
8/27/98	0.390	0.600	0.79816	0.00209		
cdb	0.360	0.540	0.80833	0.00808		
ss4-4	1.275	2.000	0.79045	0.00831	0.79877	0.00478
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	0.00385	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	0.79827	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	0.79879	0.1%
ss5-9	8/31/98	0.80336	0.00779	0.80336	0.0%
ss7-1	9/2/98	0.80797	0.00863	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	-1.5%
	Average	0.79987	0.00636	0.79724	0.33%

	dPp	dPs	Cp	dS	Avg Cp	S
ss4-6	1.300	2.000	0.79816	0.00190	0.79827	0.00194
Pass	1.100	1.700	0.79636	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	0.77693	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	0.78383	0.00294		
ss5-5	1.250	2.000	0.78266	0.01698	0.79984	0.00876
Pass	1.050	1.550	0.81482	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	0.78837	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	0.80383	0.00420		
8/28/98	0.410	0.610	0.81184	0.00381		
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	0.81184	0.00828		
cdb	0.400	0.590	0.81515	0.01179		
ss7-1	1.200	1.850	0.79733	0.01063	0.80797	0.00863
Pass	0.950	1.450	0.80133	0.00663		
9/2/98	0.420	0.620	0.81482	0.00686		
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	0.00315		

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

February 11, 1998

Horizon Engineering Lab
13585 NE Whitaker Way
Portland OR, 97230

Shortridge Calibration

On January 6, 1998 both of Horizon Engineering's Shortridge Micromanometers were checked against magnehelic 5B. Both Shortridges read within 2% of the magnehelic reading at every test point between zero and five inches of water.

DRB

Thermocouple Calibration

Date: 24-Mar-98 | Deviation Limit | @60 F 7.8 Allowable Diff. | Pb= 29.88 in Hg | JDF
Next Calibration: 20-Sep-98 | @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	316.4	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	33.6	32.6	1.0	210.8	210.8	0.0	313.0	315.8	-2.8	-0.60
Probe	7-2	33.6	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	213.8	-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	212.8	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	35.8	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	301.8	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%	
Rivol 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	786	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 7029062		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	406	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 Edgle 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

12-01-98

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@fri.orst.edu

November 24, 1998

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

Dear Dave,

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

	Charge 1	Charge 2	Units
Run time	50.5	52.5	hours
Initial MC	134.3	127.6	% dry basis
Hot check MC	13.2 @ 48:04	13.8 @ 48:30	% dry basis @ hr:min
Final MC	15.0	13.4	% dry basis
Charge size	2048	2048	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.

The final moisture content was determined using a meter after the lumber had cooled. All of the boards in the third though sixth courses from the top of the pile were sampled by driving the meter probe into the face of the board. Twenty-four boards were sampled from each charge. The moisture data is shown in Attachment 1.

The kiln schedule was provided by the mill at Warrenton. It is provided as Attachment 2. The only difference was that the first fan reversal occurred at two hours, then fan reversals were at four-hour reversal intervals throughout the rest of the schedule.

All kiln data are provided for each run as Attachment 3.

If you have questions concerning this data, please call. We look forward to working with you again in December.

Sincerely,

Michael R Milota

Michael R. Milota
Associate Professor

CC: Jon Lund, Willamette Industries

Attachment 1. Moisture data.

S:\Everyone\Milota\Horizon\MC_Charge1.xls

Hemlock Charge #1
Horizon - OSU - Willamette
November 16-18, 1998

Initial Charge Moisture Content, Oven Dry Method						
			Green	OD		Initial
Board			Wt	Wt		MC
ID			(gm)	(gm)		(%)
1			302.5	140.1		115.9
2			444.3	164.5		170.2
3			258.6	134.2		92.7
4			311.4	168.0		85.3
5			359.4	164.9		118.0
6			673.7	242.1		178.3
7			318.3	143.6		121.7
8			212.6	127.9		66.3
9			486.1	147.3		230.1
10			523.5	228.3		129.3
Sums			3890.4	1660.8		
Average						**134.3**

Near-End of Run Moisture Meter Check				
Run Time 48:30				
Course	NE side	SE side	NW side	SW side
1	12.8	11.3	15.0	9.3
2	13.4	12.2	16.3	13.8
3	13.4	12.0	9.7	12.0
4	13.1	15.6	15.5	9.6
5	12.6	14.0	14.2	10.2
6	12.5	13.9	10.0	22.0
7	15.3	17.0	9.7	15.0
8				13.0
Averages	13.3	13.7	12.8	13.1

13.2

52.38
48.08
4.30

S:\Everyone\Milota\Horizon\MC_Charge2.xls

Hemlock Charge #2
Horizon - OSU - Willamette
November 18-20, 1998

Initial Charge Moisture Content, Oven Dry Method						
			Green	OD		Initial
Board			Wt	Wt		MC
ID			(gm)	(gm)		(%)
1			390.3	163.1		139.3
2			327.5	126.3		159.3
3			436.3	177.2		146.2
4			353.6	160.2		120.7
5			437.0	199.6		118.9
6			351.1	152.2		130.7
7			352.5	176.1		100.1
8			310.5	194.8		59.4
9			397.0	153.8		158.1
10			406.9	149.7		171.9
Sums			3762.5	1653.0		
Average						**127.6**

Near-End of Run Moisture Meter Check				
Run Time 48:04				
Course	NE side	SE side	NW side	SW side
1	13.2	13.1	12.4	11.5
2	13.4	15.6	12.3	11.8
3	14.0	9.0	11.0	12.9
4	13.1	9	17.6	14.0
5	22.4	14	14.1	10.9
6	17.2	10.5	23.3	36.4
7	[illegible]		17.1	8
8				12.5
Averages	15.1	11.8	15.4	12.7

13.25

12-04-98

Willamette Industries, Inc.
BMG Engineering - Western Region

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

December 3, 1998

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

RE: Process data for Hemlock Lumber Dry Kiln Source Testing at OSU Warrenton Sawmill, Title V No. 04-0041

The following hemlock lumber data is provided for inclusion into Willamette's dry kiln source test report. The data is representative of Warrenton Sawmill's lumber and dry kiln operation.

Lumber specie:	Coastal Hemlock
Lumber dimensions (wt. ave.):	2"x8"x16'
Lumber cut date:	11/9/98
Lumber transport to OSU date:	11/10/98
	transported under cover
	OSU stored under cover outside
Lumber pieces per unit:	96
	3/4" stickers
	16 boards high, 6 boards wide per unit
Number of units:	2
Lumber grade breakdown:	85 Pcs of #2 and better
	6 Pcs of Select Structure
	4 Pcs of #3
	1 Pcs of Economy

(based on grades produced since May 1996 to October 1998)

Log source:	30 to 90 days old
	mixed decks from OR and WA
	including raft, barge, and truck wood

Target oven-dry moisture content for dried lumber: 16%
Length of kiln schedule (wt. ave.): 50 hours

Questions? Please call me at 541 924 5388.

Sincerely,

Jon Lund
Environmental Affairs

c: Greg McCoy

ADMINISTRATIVE

HORIZON ENGINEERING LLC

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

November 5, 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

5. **Test Methods to be Used:** Testing will be conducted in accordance with EPA Methods in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Appendix A, July 1, 1997; and Oregon Department of Environmental Quality (ODEQ) methods in Source Sampling Manual Volume 1, January 1992.

   Flow Rate: EPA Methods 1 and 2 (S-type pitot w/particulate traverses)
   Moisture: EPA Method 4 (impinger train technique)
   Particulate: ODEQ Method 7 (front and back halves)

VOC (TGOC): VOC as total gaseous organic compounds (TGOC) by EPA Method 25A with dilution when H_2O is more than 20%, (heated flame ionization analyzer, sample line, and filter) calibrations will be done every three hours.

6. **Continuous Analyzer Data Recording:** Data acquisition system (DAS) with strip chart records as backup. One-minute readings will be logged. Normally only run averages and the graphic outputs from the DAS are included in the test reports.

7. **Continuous Analyzer Gas Sampling:** Fixed point in the exhaust. VOC sampling will be continuous over each cycle. Drift checks will be done once every three hours. One 1-hour particulate (with moisture and flow rate) test will be done during each three-hour fan cycle.

8. **Quality Assurance /Quality Control (QA/QC)**: Documentation of the procedures and results will be presented in the Source Test Report for review. This documentation will include at least the following:

Continuous Analyzer QC Procedures: Field crews will operate the analyzers according to the manufacturer's specification, the test method's requirements and Horizon's additional specifications. On-site quality control procedures include:

- calibration (zero and span) every fan cycle and calibration error (linearity) checks before start and after any calibration adjustments.
- pre- and post-test zero bias and span bias checks
- checks performed with NIST-traceable gases
- data acquisition system will record one-minute readings
- strip chart recordings taken for backup to the electronic data acquisition system

Manual Equipment QC Procedures: Operators will perform pre- and post-test leak checks on the sampling system and pitot lines. Thermocouple systems are checked for ambient temperature before heaters are started. Nozzles and pitots are inspected for nicks or dents before each test. Pre- and post-test calibrations on the meter boxes will be included with the report, along with semi-annual calibrations on the pitots, thermocouples and nozzles. Blank reagents (water, acetone, and filter) are submitted to the laboratory with the samples. Liquid levels are marked on sample jars in the field and are verified by the laboratory.

9. **Number of Sampling Replicates and their Duration:** Two complete drying cycles to be sampled for each specie.

10. **Reporting Units for Results:** As concentrations (ppmv or gr/dscf), rates (lb/hr), and on a production basis (lb/1000 b.f.)

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	Gracia Castro
	(503) 229-5579	(541) 726-2514
Fax	(503) 229-5265	(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 Broderick

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

Willamette Industries, Inc.
BMG Administration and Sales - Western Region

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

October 27, 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Beth Moore
Department of Environmental Quality
2020 SW 4th Ave, Suite 400
Portland, Oregon 97201

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

RE: Dry Kiln Source Test Proposal and Plan
Warrenton Sawmill Title V Permit No. 04-0041
Vaughn Laminating Complex Title V Permit No. 200550

Willamette Industries (Willamette) is required to conduct emission factor verification testing at its Warrenton and Vaughn lumber dry kiln operations. Due to inherent difficulties of testing each facility's dry kilns, Willamette proposes to conduct the emission factor verification testing at the Oregon State University (OSU) Forest Research Laboratory. Horizon Engineering will conduct the testing. Their source test plan is attached.

The Title V Operating Permits for Warrenton and Vaughn require emission factor verification source tests for particulate matter and volatile organic compounds from the facility's lumber dry kilns. However, obtaining a representative measurement is very difficult when these kilns have multiple vents that open and close at different times, and then alternate from exhaust to intake every few hours. In lieu of testing the facilities' kilns, the Title V permits for these two facilities allow testing to be done on a similar type dry kiln provided Willamette submits test data from at least two tests.[1]

Willamette proposes to perform two source tests for Hemlock and two for Douglas Fir at the Forest Research Laboratory at OSU using their Wellons lumber dry kiln to satisfy the permit requirement. This kiln, like Warrenton's and Vaughn's, is steam heated, natural drafted, and alternates the fan direction at intervals so each side of the lumber receives an equal volume of heated air. Notably, OSU's kiln has only two stacks, one for air inlet and the other for exhaust, which alternate in conjunction with the alternating internal fan direction. One exhaust stack simplifies and greatly improves the accuracy of the source testing.

---

[1] Warrenton: Condition 32.b., Title V Operating Permit 04-0041.
Vaughn: Condition 30.b., Title V Operating Permit 20-0550.

Factors affecting emissions of VOC and PM as condensable VOC from lumber drying are rough lumber grade, beginning and ending lumber moisture contents, lumber dimensions, and wood specie. Warrenton will be supplying Hemlock lumber and Vaughn will supply the Douglas Fir lumber. Representative loads of lumber (kiln charges) will be based on the dimensional mode[2] , representative volumes of each rough lumber grade produced, and typical green lumber moisture contents. The kiln charges will be built of fresh sawn lumber and 3/4" spacers (stickers), banded, and then shipped under cover to OSU.

The kiln drying schedule for the Hemlock charges[3] will be 50 hours each. The dry lumber moisture content target will be 16 $\%_{MC\,OD}$. The drying schedule for the Douglas Fir charges[4] will be 60 hours each. The dry lumber moisture content target for Douglas Fir will be 12 $\%_{MC\,OD}$.

The OSU kiln will be operated by Professor Mike Milota and assistant(s). OSU personnel will load and unload the kiln, program the drying schedule based on dry lumber moisture content targets, operate and monitor the kiln, measure beginning and ending lumber moisture contents, and record the kiln's wet and dry bulb temperatures during each drying cycle.

This emission factor verification source test proposal and attached test plan provides for representative measurements of PM and VOC emissions and selection of kiln charges for the Warrenton and Vaughn dry kiln operations. Willamette Industries requests the Department and Lane Regional expedite their review of this proposal and attached source test plan. A letter acknowledging receipt and approval of the test methodologies is requested.

If there are any questions or comments please contact Jon Lund at 541 924 5388.

Statement of Certification:

Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete.

Mr. Tom Arlint
Name of designated responsible official

General Manager
Title of responsible official

Signature of responsible official

10/28/98
Date (mm/dd/yy)

[2] Mode is defined as the dimension of lumber that is processed the most.
[3] Hemlock charges will be built of 2"x8"x16' boards (bd); 16 bd high and 6 bd wide.
[4] Douglas Fir charges will be built of 2"x6"x16' boards (bd); 20 bd high and 8 bd wide.

Enclosure: Horizon Engineering October 27, 1998 Source Test Plan

c: (1) Additional Copy
of letter and enclosure
To: Beth Moore
Gracia Castro

Certified Mail
DEQ-Air Quality Div.
811 SW Sixth Ave.
Portland, OR 97204

Certified Mail
Air Compliance Division
US EPA
Mail Stop AT-084
Seattle, WA 98101

Mr. Greg McCoy, Warrenton Sawmill
Mr. Art Sand, Vaughn Laminating Complex
Dr. Mike Milota, OSU Forest Research Laboratory
Mr. Jim Boylan, DEQ Western Region, Salem Offices

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
TTY (503) 229-5471

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