AP32 Section:	12.5.1
Background Chapter	3
Reference:	38
Title:	Source Evaluation Report, Oregon Steel Mills, Portland, OR, Electric Arc Furnace Baghouse. November 7, 2001. Prepared for Oregon Steel Mills, Portland, OR by Michele R. Kinney & David R. Rossman, P.E. Project No. 1685.

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Project No. 1685

SOURCE EVALUATION REPORT

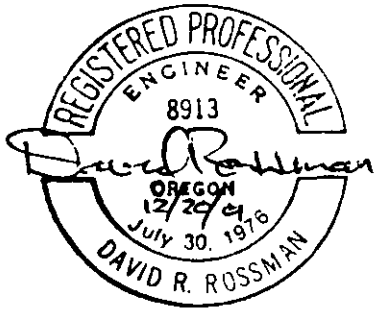
Oregon Steel Mills
Portland, Oregon

Electric Arc Furnace Baghouse
Particulate, CO, NO_x, SO_2, VOC, Lead and Opacity

November 7, 2001

Prepared for
Oregon Steel Mills
14400 N. Rivergate Blvd.
Portland, Oregon 97203

by Michele R. Kinney &
David R. Rossman, P.E.



Expires 12/31/02

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1. CERTIFICATIONS

1.1 Test Team Leader

I hereby certify that the test detailed in this report, to the best of my knowledge, was accomplished in conformance with applicable rules and good practices. The results submitted herein are accurate and true to the best of my knowledge.

Name: Michael J. Eisele, E.I.T.

Signature _____ Date 12/17/01

1.2 Report Reviewer

I hereby certify that I have reviewed this report and find it to be true and accurate, and in conformance with applicable rules and good practices, to the best of my knowledge.

Name: David R. Rossman, P.E.

Signature _____ Date 12/20/01

2. INTRODUCTION

2.1 Client: Oregon Steel Mills

2.2 Physical Location: 14400 N. Rivergate Blvd., Portland, OR 97203

2.3 Mailing Location: P. O. Box 2760, Portland, OR 97208

2.4 Test Log

Test Date	Source Name	Pollutants
November 7, 2001	Electric Arc Furnace Baghouse	Particulate, CO, NO_x, SO_2, VOC, Lead and Opacity

2.5 Test Purpose: Required by Title V Permit No. 26-1865, conditions 37, 38 and 39, issued by the Oregon Department of Environmental Quality (ODEQ).

2.6 Background Information: The expired ACDP Permit required testing for particulate, lead, CO, and opacity on a quarterly basis. The new Title V Permit requires the list above annually.

2.7 Participants:

Horizon Personnel:

Michael J. Eisele, E.I.T., Team Leader
Ryan S. Smith, Field Technician
Tim J. Hertel, Field Technician
Dharma Cole, E.I.T., Field Technician
Brian Galvin, Field Technician
Jay Griffith, Field Technician
Michael E. Wallace, Calculations and QA/QC
David R. Rossman, P.E., Report Review
Michele R. Kinney, Technical Writer

Test Arranged by: Debbie Deetz Silva, Oregon Steel Mills
Source Operator: Mike Anderson
Test Plan Sent to: Jack Herbert, ODEQ

3. SUMMARY OF RESULTS

3.1 Table(s) of Results

Particulate and Lead Test Results

Test Date: November 7, 2001

	Units	Run 1	Run 2	Run 3	Average
Start Time		10:31	12:09	13:50	
End Time		12:05	13:33	15:17	
Sampling Time	min	70	65	60	65
Sampling Results					
Particulate Conc.(Actual)	gr/scfd	0.00069	0.00083	0.00106	0.00086
Particulate Rate	lb/hr	3.1	3.7	4.7	3.9
Based on Cold Charge	lb/ton	0.0227	0.0268	0.0344	0.0280
Sample Volume	dscf	2,214	1,978	1,870	2,021
Sample Weight, Total	mg	98.6	106.6	128.3	111.2
Percent Isokinetic	%	98	100	100	98
Lead Rate	lb/hr	0.036	0.043	0.054	0.044
Based on Cold Charge	lb/ton	0.00026	0.00031	0.00039	0.00032
% of Total Particulate	%	1.14	1.16	1.15	1.15
Opacity	%	0	0	0	0
Source Parameters					
Inlet Flow Rate	dscf/min				389,000
Outlet Flow Rate	dscf/min	530,000	525,000	522,000	526,000
Temperature, Outlet	°F	143	158	155	152
Process Data					
Cold Charge Production	tons/hr	137.36	139.40	137.82	138.20
Baghouse Press. Drop, Avg.	in H_2O	4.5	5.5	6.0	5.3

Table 2

Gaseous Emissions Test Results

Test Date: November 7, 2001

		Units	Run 1	Run 2	Run 3	Average
Start Time			10:31	12:09	13:50	
End Time			12:05	13:33	15:17	
Sampling Time		min	70	65	60	65
Sampling Results						
O_2		%	20.5	20.5	20.5	20.5
CO_2		%	0.6	0.5	0.6	0.6
CO	Concentration	ppmv	202	135	124	154
	Rate	lb/hr	341.6	229.6	210.8	260.7
	Based on Cold Charge	lb/ton	2.49	1.65	1.53	1.89
NO_x	Concentration	ppmv	11	12	11	11
	Rate	lb/hr	30.5	32.9	29.5	31.0
	Based on Cold Charge	lb/ton	0.22	0.24	0.21	0.22
SO_2	Concentration[1]	ppmv	5	5	4	4
	Rate	lb/hr	19.1	21.2	14.9	18.4
	Based on Cold Charge	lb/ton	0.14	0.15	0.11	0.13
TGOC	Concentration	ppmvC	29	21	21	24
	Rate	lbC/hr	21.1	15.2	15.1	17.1
	Based on Cold Charge	lbC/ton	0.15	0.11	0.11	0.12
TGNMOC[2]	Concentration	ppmvC	9	9	12	10
	Rate	lbC/hr	6.7	6.4	9.1	7.4
	Based on Cold Charge	lbC/ton	0.049	0.046	0.066	0.053

[1] SO2 results may be slightly high due to excessive drift during the testing. The results are drift corrected.
[2] VOC emissions as total gaseous non-methane organic compounds

3.2 Description of Collected Samples:

See Blank Correction and Rinse Allocation in Appendix.

3.3 Discussion of Errors and Quality Assurance Procedures

This table is taken from a paper entitled "Significance of Errors in Stack Sampling Measurements", by R.T. Shigahara, W.F. Todd and W.S. Smith. It summarizes the maximum error expressed in percent, which may be introduced into the particulate test procedures by equipment or instrument limitations.

Measurement	% Max Error
Stack Temperature Ts	1.4
Meter Temperature Tm	1.0
Stack Gauge Pressure Ps	0.42
Meter Gauge Pressure Pm	0.42
Atmospheric Pressure Patm	0.21
Dry Molecular Weight Md	0.42
Moisture Content Bws (Absolute)	1.1
Differential Pressure Head ΔP	10.0
Orifice Pressure Differential ΔH	5.0
Pitot Tube Coefficient Cp	2.4
Orifice Meter Coefficient Km	1.5
Diameter of Probe Nozzle Dn	0.80

QA procedures outlined in the test methods were followed, including equipment specifications and operation, calibrations, sample recovery and handling, calculations and performance tolerances.

Analyzer system checks performed are noted on the Calibration Field Record sheet, with procedures documented in the QA/QC section in the Appendix. All calibration standards used in the testing were EPA Protocol 1 or traceable to NIST standards. Certificates for the gases are in the Appendix. Tables 3a and 3b summarize the quantifiable QA checks for the continuous emissions monitors.

Table 3a

QA/QC Checks – Continuous Analyzers, Daily Checks

	Cal. Error <2% span or <5% span[3]	System Bias <5%	Cylinder value, % of span[4]	Instrument Span
O_2:				25%
high	0%	--	84%	
mid	0%	0%	46%	
zero	0%	0%	0%	
CO_2:				25%
high	0%	--	87%	
mid	1%	1%	50%	
zero	0%	0%	0%	
CO:				2000 ppmv
high	0%	--	44%	
mid	0%	1%	25%	
mid	0%	0%	4%	
zero	0%	0%	0%	
NO_x:				200 ppmv
high	1%	1%	92%	
mid	1%	0%	45%	
mid	0%	0%	13%	
zero	0%	0%	0%	
SO_2 :				30 ppmv
high	0%	--	88%	
mid	1%	3%	51%	
zero	0%	1%	0%	
VOC #1:				100 ppmv
high	NA[5]	0%	89%	
mid	NA	0%	52%	
mid	NA	0%	30%	
mid	NA	0%	9%	
zero	NA	0%	0%	
VOC #2:				100 ppmv
high	NA[6]	0%	89%	
mid	NA	0%	52%	
mid	NA	0%	29%	
mid	NA	0%	9%	
zero	NA	0%	0%	

Response Time: 45 seconds

[3] Calibration Error specifications: 2% for Methods 3A, 6C, and 7E; 5% for Method 25A.
[4] Acceptable values for all calibration gases except VOC: High-level=80-100% of span, mid-level=40-60% of span; for VOC calibration gases: high-level=80-90%, mid-level=45-55%, low-level=25-35%.
[5] Method 25A requires system bias checks as in Method 6C, but calls them calibration error checks.
[6] Method 25A requires system bias checks as in Method 6C, but calls them calibration error checks.

Table 3b

QA/QC Checks – Continuous Analyzers Individual Run Checks

	O_2	CO_2	CO	NO_x	SO_2	VOC 1 & 2
Zero Drift (<3% span)						
Run 1-3	0%	0%	0%	0%	19%[7]	2% 2%
Calibration Drift <3% span						
Mid-Range						
Run 1-3	1%	0%	0%	0%	15%[7]	3% 3%
Mid-Range						
Run 1-3	--	--	1%	1%	--	6%[7] 3%
Mid-Range						
Run 1-3	--	--	--	--	--	11%[7] 2%
High-range						
Run 1-3	--	--	1%	1%	0%	--% --%

Four audit samples (two liquid samples and two filter samples), prepared by EPA in accordance with Method 12 and provided to Jack Herbert of ODEQ, were submitted to Environmental Services Laboratory November 21, 2001 along with the particulate samples to be analyzed for lead.

On December 11, 2001, Horizon Engineering notified Jack Herbert via fax of the audit sample lab results, and he assured us that the lab results were acceptable. The audit sample lab results are in the Calibration Information section of the Appendix. We have no knowledge of the actual EPA numbers.

4. SOURCE DESCRIPTION AND OPERATION

4.1 Process and Control Device Description and Operation:

The EAF baghouse at Oregon Steel Mills cleans particulate from two significant sources in the melt shop. The main furnace, No. 3, normally produces between 100 and 115 tons of steel per heat from two charges of scrap metal, plus some molten

[7] More drift than normally allowable was anticipated because of the long duration of the sampling and was addressed in the Test Plan prior to sampling. Analyzer results have been drift corrected.

"pour back" material left over from casting. Records for each heat during the testing times are in the Production-Process Data Section of the Appendix.

The main furnace dust control system is a "fourth hole" duct connection to the top of the furnace, and a series of three openings in the roof above the main furnace that can open into the duct to the baghouse. Each of these pick-up points has a damper that is controlled automatically by certain furnace operations. Generally, the roof vents are open for several minutes following charging of the furnace.

The ladle metallurgy furnace is between the main furnace and the casting area and is used to fine-tune the content and temperature of the molten steel before being cast. Charging is only of molten steel and alloying material and is the minor contributor to the baghouse system. The exhaust from this furnace enters the duct system downstream from the main furnace and roof vents.

All of the pick-up points are evacuated into an 11 foot-diameter duct by two 1250-Hp fans. The fans have automatically controlled dampers on the inlets.

Particulate control is by a 16-compartment, (21 ft. by 14 ft. each) Industrial Clean Air, reverse-air type, baghouse with seamless tube polyester bags. Magnehelic gauges on each of the compartments showed pressure drops averaging 5.3 inches of water.

4.2 Test Ports: Ports and traverse points are described and diagrammed on the Field Data sheets.

4.3 Test Duct Characteristics:

Cyclonic Flow: No Cyclonic flow expected. The inlet (flow traverse) location has been checked for cyclonic flow in the past and it was not cyclonic.
Meets EPA M-1 Criteria: No.

4.4 Process & Control Equipment Flow Diagram: See Process/Sampling Equipment Flow Diagram in Appendix.

4.5 Operating Parameters: See Production/Process Data section of Appendix.

4.6 Process Startups/Shutdowns or Other Operational Changes During Tests: Process was not continuous during testing. The process was stopped for approximately 10 minutes between Runs 2 and 3 for patching of the furnace walls.

5. SAMPLING AND ANALYTICAL PROCEDURES

5.1 Sampling Procedures

5.1.1 Sampling and Analytical Methods

Testing was conducted in accordance with EPA Methods in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Appendix A, July 1, 2000; and Oregon Department of Environmental Quality (ODEQ) methods in Source Sampling Manual Volume 1, January 1992.

Inlet tests:

Flow Rate: EPA Methods 1 and 2 (at BH inlet, twice on test day)
Moisture: ODEQ Method 4 (wet bulb and dry bulb temperatures)
CO_2 and O_2: EPA Method 3A
SO_2: EPA Method 6C
NO_x: EPA Method 7E
CO: EPA Method 10
VOC: EPA Method 25A, (heated sample line and two analyzers, one with simultaneous VOC "cutter" for back-out of CH_4 content)

Outlet tests:

Flow Rate: EPA Methods 1 and 2 (at each compartment, as done in past)
Particulate: ODEQ Method 8 (High Volume sampler)
Lead: Analysis of M-8 catch, with audit sample analysis
Opacity: EPA Method 9 (six minutes per test)

5.1.2 Sampling Notes:

Flow Rates There are openings at the tube-sheet level of the baghouse where ambient air enters for temperature control around the bags. This means that the

baghouse outlet flow rate is higher than the inlet duct flow rate. Because CO is measured in the duct before dilution takes place, the inlet flow is applied to that parameter. Particulate is measured in the diluted outlet compartments, so separate flow measurements were made at those locations. According to plant personnel, closing off the ambient air openings is not feasible.

Inlet Flow Measurement

The baghouse inlet duct volume flow rate was determined from pitot traverses before and after the baghouse testing according to EPA Methods 1 and 2. Velocity pressure was taken using an S-type pitot with a Shortridge "Airdata" 870 digital micromanometer, and temperature measurements with an attached k-type thermocouple and a Fluke Model 52 digital thermocouple indicator. The traverses included 48 points (24 on each diameter) through ports located off the platform on the melt shop roof. Leak checks were made on the pitot system after each of the traverses.

A check for cyclonic flow at the measurement points was done in December 1991 and was found to be well within the criteria specified in EPA Method 1, Section 2.4, which calls for an average of less than 20°.

Outlet Flow Measurement

The velocity was also measured at the outlet of each compartment using an S-type pitot and the micromanometer with attached thermocouple. The micromanometer has a resolution of 0.0001 inches of water. The flow was determined from 5-point pitot traverses through one port per compartment. Flow was measured in the same ports as particulate.

Because one of the compartments is always shut off for cleaning, outlet flow rates used for calculating emissions are based on one less compartment than the total available.

Particulate and Lead Three test runs were made each lasting through two complete furnace heat cycles. The sampler running times ranged from 60 to 70 minutes in length; each test was started and stopped while the main furnace was being tapped. Although there is some emission to the furnace room during this

operation, the concentration going to the baghouse system is relatively low compared to that when the furnace is in melting mode.

Sampling was done in the area above the bags where the flow is angled diagonally up to the cupola centered on the top of the baghouse. A diagram of the top of the baghouse, showing where the sampler was positioned, is in the Appendix. The location of the particulate sampling nozzle during testing was at velocity traverse point two. The sampling was done isokinetically, using the velocity found from the outlet velocity traverse done just before the particulate sampling run.

Each compartment was sampled for five minutes. Near the end of each sampling interval, the orifice temperature was recorded as well as the temperature of the outlet gas stream. A new sampler flow rate was calculated based on the pre-survey data of the next compartment. At the end of the interval, the sampler was shut off, moved to the next compartment and restarted.

Sample volume calculations were based on the orifice pressure drops combined with the orifice temperatures and the calibration curve for the sampler. Emission rates were calculated using the flow rates measured at the baghouse outlet.

Gases Gas sample for the analyzers was taken from a fixed sampling point in the baghouse inlet duct below the baghouse, approximately below compartment No. 14.

5.1.3 Sample Analysis

Analyte	**Laboratory**
Particulate	Antech
Lead and Audit Samples	Environmental Services Laboratory

5.2 Sampling Train Diagrams

Figure 1

EPA Methods 3A, 6C, 7E & 10 Analyzer Sample System Diagram

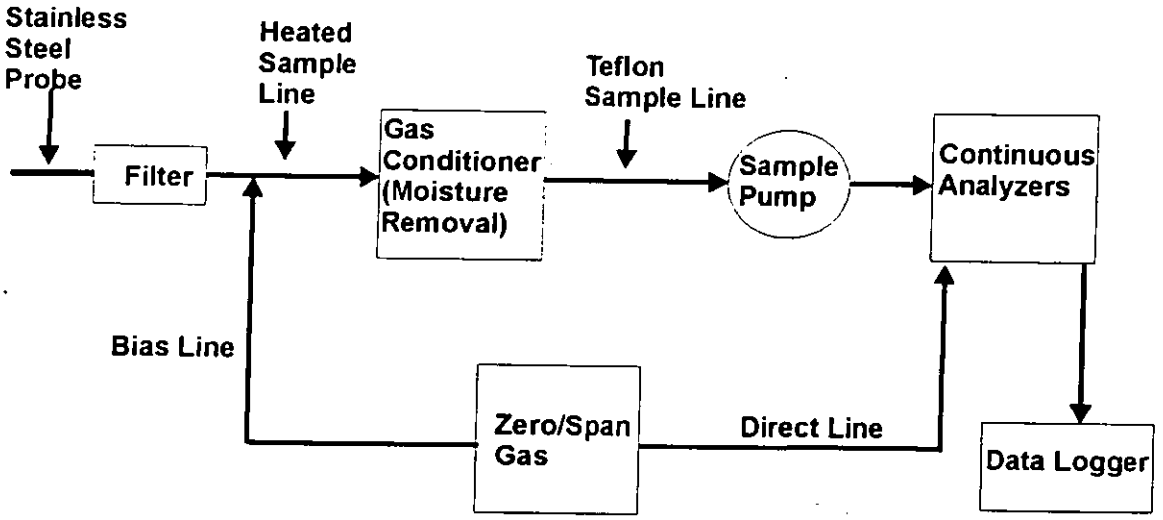
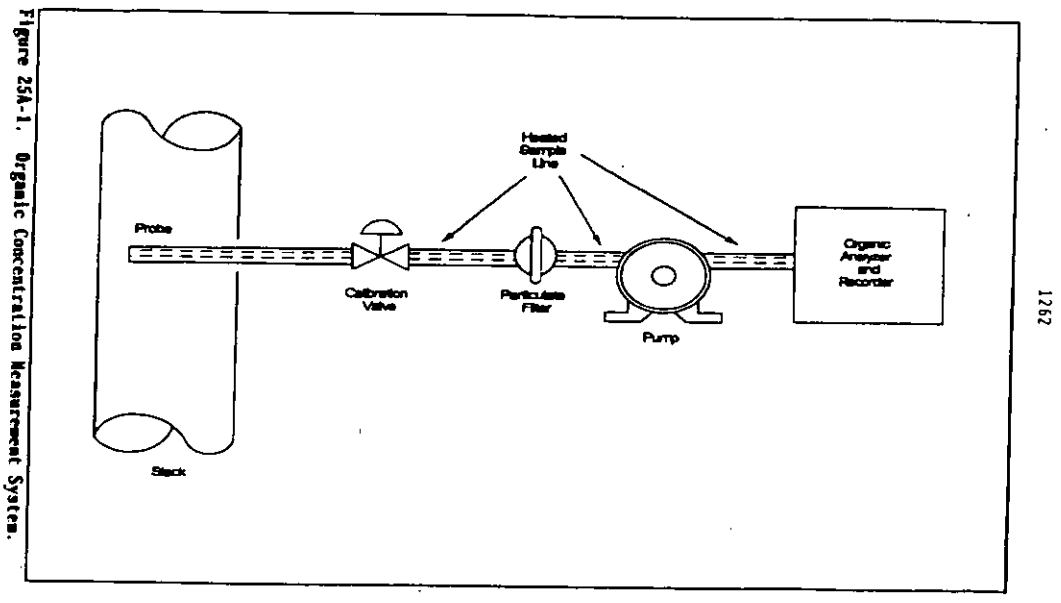


Figure 2

EPA Method 25A VOC Analyzer Sample System Diagram



5.3 Horizon Test Equipment

5.3.1 Manual Methods

Equipment Name	Equipment Identification
Hi Volume Orifice	Horizon No. 1192
Pitots and Thermocouples	11-S, 14-S
Magnehelic Gauge	0-1F (orifice ΔH)
Micro manometer	Shortridge No. 2
Barometer	Test Van II

5.3.2 Continuous Emissions Monitors and Methods

Gas	Brand	Model	Range	Measurement Method	Method
O_2	Servomex	1400	0-25%	Paramagnetic	3A
CO_2	Servomex	1400	0-25%	Chopperless NDIR	3A
CO	Thermo Env	48	0-2000 ppm	Gas Filter Correlation	10
TGOC	J.U.M.	VE-7	0-100 ppm	Flame Ionization	25A
NO_x	Thermo Env	42H	0-200 ppm	Chemiluminescent	7E
SO_2	West. Resch	721M	0-30 ppm	Non Disp. Ultra-violet	6C

5.3.3 Continuous Emissions Monitors Sampling Setup

Sampling:	Above listed gases except TGOC.
Probe:	Stainless Steel with sintered stainless and polyester filters.
Sample Line(s):	Teflon (heated)
Conditioning:	Refrigerated M & C Cooler
Data Logger:	ESC Model 8816

Sampling:	TGOC.
Probe:	Stainless
Conditioning:	none
Sample Line(s):	Teflon (heated)
Pump:	heated, internal to analyzer
Data Logger:	ESC Model 8816

6. DISCUSSION

The results of the testing should be valid in all respects. All quality assurance checks including leak checks, instrument checks, and calibrations, were within method-allowable tolerances.

As previously noted, drift on the SO_2 and VOC analyzer systems was higher than in normal specifications. The possibility of this issue was discussed in the Test Plan in Paragraph 18. The numbers in the results table have been corrected for that drift.

APPENDIX

Nomenclature & Drift Correction Documentation

Nomenclature

Constants	Value	Units	Definition	Ref
Pstd(1)	29.92126	inHg	Standard Pressure	CRC
Pstd(2)	2116.22	lbf / ft²		CRC
Tstd	527.67	°R	Standard Temperature	CRC
R	1545.33	ft lbf / lbmol °R	Ideal Gas Constant	CRC
MWatm	28.965	lbm / lbmole	Atmospheric (20.946 %O2, 0.033% CO2, Balance N2+Ar)	
MWc	12.011	lbm / lbmole	Carbon	CRC
MWco	28.010	lbm / lbmole	Carbon Monoxide	CRC
MWco2	44.010	lbm / lbmole	Carbon Dioxide	CRC
MWh2o	18.015	lbm / lbmole	Water	CRC
MWno2	46.006	lbm / lbmole	Nitrogen Dioxide	CRC
MWo2	31.999	lbm / lbmole	Oxygen	CRC
MWso2	64.063	lbm / lbmole	Sulfur Dioxide	CRC
MWn2+ar	28.154	lbm / lbmole (Balance with 98.82% N2 & 1.18% Ar)	Emission balance	
C1	385.3211	ft³ / lbmol	Ideal Gas Constant @ Standard Conditions	
C2	816.5455	inHg in²/ °R ft²	Isokentics units correction constant	
Kp	5129.4	ft / min [(inHg lbm/mole) / (°R inH2O)] ^½	Pitot tube constant	Ref 2.5.1

Symbol	Units	Definition	Calculating Equation or Source of Data	EPA
As	in²	Area, Stack		
An	in²	Area, Nozzle		
Bws	%	Moisture, % Stack gas	[100 Vw(std) / [Vw(std)+Vm(std)]]	Eq. 5-3
C	ppmv-C	Carbon (General Reporting Basis for Organics)		
C1	ft3/lbmol	Gas Constant @ Standard Conditions	[R Tstd / Pstd(2)]	
C2	inHg in²/ °R ft²		[14,400 Pstd / Tstd]	
Cd	lbm-GAS / MMdscf	Mass of gas per unit volume	[Cgas MWgas / C1]	
cg	gr/dscf	Grain Loading, Actual	[15.432 mn / Vm(std) 1,000]	Eq. 5-6
cg @ X%CO2	gr/dscf	Grain Loading Corrected to X% Carbon Dioxide	[X% / CO2%]	
cg @ X%O2	gr/dscf	Grain Loading Corrected to X% Oxygen	[(20.946-X) / (20.946-O2)]	
Cgas	ppmv, %	Gas Concentration, (Corrected)		
Cgas @ X%CO2	ppmv	Gas Concentration Correction to X% Carbon Dioxide	[X% / CO2%]	
Cgas @ X%O2	ppmv	Gas Concentration Correction to X% Oxygen	[(20.946-X%) / (20.946-O2%)]	
CO	ppmv	Carbon Monoxide		
Co	ft	Outer Circumference of Circular Stack		
Ci	ft	Inner Circumference of Circular Stack		
CO2	%	Carbon Dioxide		
Cp		Pitot tube coefficient		
Ct	lb/hr	Particulate Mass Emissions	[60 cg Qsd/ 7,000]	
dH	in H2O	Pressure differential across orifice		
Dn	in	Diameter, Nozzle		
dp^½		Average square root of velocity pressure		
Ds	in	Diameter, Stack		
E	lb / MMBtu	Pollutant Emission Rate	Cgas Fd MWgas (20.946 / (20.946-O2)) / (1,000,000 C1)	
Fd	dscf / MMBtu	F Factor for Various Fuels		Table 19-1
I	%	Percent Isokinetic	[C2 Ts(abs) Vm(std) / (vs Ps mfg An Ø)]	Eq. 5-8*
Md	lbm / lbmole	Molecular weight, Dry Stack Gas	[(1-%O2-%CO2)(MWn2+ar)+(%O2 MWo2)+(%CO2 MWco2)]	Eq. 3-1*
mfg		Mole fraction of dry stack gas	[1-Bws/100]	
Mgas	lbm/hr	Gaseous Mass Emisisons	[60 Cgas(ppmv) MW Pstd(2) Qsd / 1,000,000 R Tstd]	
mn	mg	Particulate lab sample weight		
Ms	lbm / lbmole	Molecular weight, Wet Stack	[Md mfg +MWh2o (1-mfg)]	Eq. 2-5
MW	lbm / lbmole	Molecular Weight		
NO2	ppmv-NO2	Nitrogen Dioxide (General Reporting Basis for NOx)		
NOx	ppmv-NO2	Nitrogen Oxides (Reported as NO2)		
O2	%	Oxygen		
OPC	%	Opacity		
Pbar	in Hg	Pressure, Barometric		
Pg	in H2O	Pressure, Static Stack		
Po	in Hg	Pressure, Absolute across Orifice	[Pbar + dH / 13.5951]	
Ps	in Hg	Pressure, Absolute Stack	[Pbar + Pg / 13.5951]	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
θ	min	Time, Total sample		

* Based on equation

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DRIFT CORRECTION DOCUMENTATION

EPA Drift Equations:

- Method 3A: Oxygen and Carbon Dioxide

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

- Method 6C: Sulfur Dioxide

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

- 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.

Particulate and Lead Calculation Sheets
Emission Calculation Worksheets and
Blank Correction and Filter Rinse Allocation
Laboratory Results, Worksheets, & Chain of Custody
Filter Tare Weights
Baghouse Sampling Diagram

Particulate and Lead Emissions

Plant	Oregon Steel Mills								File	1685	
Source	ICA Baghouse-EAF								Tester	MJE/TJH/CDB	
Date	07-Nov-2001								Analysis/QA	MEW	
Run#	1	Wt(mg)	98.579	Stack Area	As=	969.6	sqft	Mol Wt. Dry	Md=	29.01	molwt
Points		Lead (mg)	1.126	Stack Temp.	Tdb=	143	°F	Mol Wt. Wet	Ms=	28.80	molwt
				Stack Temp.	Twb=	85	°F	Barometeric	Pb=	30.50	in H2O
Hivol ID	SN#	1192		Moisture	bws=	1.91	%	Static Pres.	Pstat=	0.04	in H2O
Orifice	A=	47.8947		Nozzle Dia.	Dn=	3.109	in	Stack Pres.	Ps=	29.60	in Hg
Constants	B=	0.4763		Nozzle Area	An=	7.59	sqin	Pitot	Cp=	0.8029	

TIME	Compartment POINT #	pt	Velocity Pressure dP inH2O	Velocity vs fpm	Orifice in H2O dHo Calc	Pressure in H2O dHo Act	Temp (F) Orifice Tor	Temp (F) Stack Tso	Time min t	Rate cfm Standard Q@68°F	Volume cuft Standard @68°F	Volume cuft Orifice @Tor
10:31												
10:37	1	3	0.0392	685.6	0.4524	0.4600	110.0	143.0	5.0	31.90	159.5	172.2
10:44	2	3	0.0248	539.0	0.2968	0.2800	130.0	129.0	5.0	24.77	123.9	138.4
10:51	3	3	0.0361	647.5	0.4441	0.4200	130.0	124.0	5.0	30.05	150.3	167.9
10:58	4	3	0.0615	851.6	0.7775	0.7300	140.0	133.0	5.0	38.79	194.0	220.4
11:04	5	3	0.0456	731.5	0.5748	0.5400	144.0	130.0	5.0	33.50	167.5	191.6
11:11	6	3	0.0358	654.1	0.4286	0.4200	132.0	141.0	5.0	30.00	150.0	168.2
11:18	7	3	0.0336	636.3	0.4002	0.4000	136.0	146.0	5.0	29.22	146.1	164.9
11:25	8	3	0.0310	606.7	0.3749	0.3700	138.0	137.0	5.0	28.11	140.5	159.2
11:31	9	3	0.0353	646.3	0.4297	0.4200	136.0	135.0	5.0	29.91	149.5	168.8
11:38	10	3	0.0450	737.6	0.5456	0.5300	140.0	148.0	5.0	33.30	166.5	189.2
11:45	11	3	0.0509	784.5	0.6313	0.6000	150.0	148.0	5.0	35.05	175.3	202.5
11:52	12	3	0.0342	652.5	0.4020	0.3900	148.0	166.0	5.0	28.60	143.0	164.7
11:58	13	3	0.0484	777.5	0.5807	0.5600	152.0	168.0	5.0	33.87	169.3	196.3
12:05	14	3	0.0528	799.0	0.6475	0.6200	142.0	148.0	5.0	35.83	179.2	204.3
Time weighting used in averaging =>			696.4	0.4990	0.4814	137.7	142.6	70.00	31.64	2,214.5	2,508.6	

				Run#	1	2	3	Average
Sample Volume	V@68 (Pb/29.92)(1-bws/100)	dscf	Vd		2,214.2	1,978.4	1,870.0	2,020.9
Total Flowrate	Oultet Flow	dscf/min	Qsd		530,486	524,781	522,453	525,906
Particulate								
Grain loading	0.01543 Wt/Vd	gr/dscf	Cg		0.00069	0.00083	0.00106	0.00086
		ug/m3			1572	1902	2423	1966
Emissions	0.00857 Cg Qs	lbm/hr	Ct		3.1237	3.7387	4.7426	3.8683
		lbm/ton			0.0227	0.0268	0.0344	0.0280
LEAD								
Grain loading	0.01543 Lead/Vd	gr/dscf	Cg		0.0000078	0.0000096	0.0000121	0.0000099
		ug/m3			18.0	22.0	27.8	22.6
Emissions	0.00857 Cg Qs	lbm/hr	Ct		0.0357	0.0433	0.0543	0.0444
		lbm/ton			0.00026	0.00031	0.00039	0.00032
Avg Sample Rate	V@Tor / t	acf/min	Qan		35.84	36.16	36.19	36.06
Avg Velocity @ Sample Point	vs=Qa/As	fpm	vs		696.42	697.33	686.91	693.55
Avg Orifice temp		°R	Tor		597.38	610.05	613.25	606.90
Avg Stack temp		°R	Ts		602.24	617.36	614.59	611.40
Avg Nozzle Velocity	Qan*Ts / An*Tor	fpm	vn		685.31	694.19	687.99	689.16
% ISOKINETIC	100 vn/vs		%I		98.4	99.6	100.2	99.4
Percent Lead of Total Particulate			%		1.14	1.16	1.15	1.15

* The baghouse has 16 compartments. One is always cycling.
* Each Compartment is 52"x179"

Particulate and Lead Emissions

Plant	Oregon Steel Mills								File	1685	
Source	ICA Baghouse-EAF								Tester	MJE/TJH/CDB	
Date	07-Nov-2001										
Run#	2		Wt(mg)	106.572	Stack Area	As=	969.6	sqft	Mol Wt. Dry	Md=	29.02 molwt
Points	10		Lead(mg)	1.234	Stack Temp.	Tdb=	137	°F	Mol Wt. Wet	Ms=	28.52 molwt
					Stack Temp.	Twb=	98	°F	Barometeric	Pb=	30.50 in H2O
Hivol ID		SN#	1192		Moisture	bws=	4.53	%	Static Pres.	Pstat=	0.03 in H2O
Orifice		A=	47.8947		Nozzle Dia.	Dn=	3.109	in	Stack Pres.	Ps=	30.50 in Hg
Constants		B=	0.4763		Nozzle Area	An=	7.59	sqin	Pitot	Cp=	0.8029

TIME	Compartment POINT #	pt	Velocity Pressure dP inH2O	Correct fpm Vs	Orifice in H2O dHo Calc	Pressure in H2O dHo Act	Temp (F) Orifice Tor	Temp (F) Stack Ts	Time min t	Rate cfm Standard Q@68°F	Volume cuft Standard @68°F	Volume cuft Orifice @Tor
12:09												
12:15	15	3	0.0286	576.83	0.3338	0.3400	132.0	137.0	5.0	27.13	135.6	152.1
12:22	1	3	0.0432	726.54	0.5037	0.5000	150.0	167.0	5.0	32.14	160.7	185.7
12:28	2	3	0.0412	706.11	0.4841	0.4800	150.0	161.0	5.0	31.52	157.6	182.1
12:35	3	3	0.0508	784.08	0.6042	0.6000	151.0	161.0	5.0	35.03	175.1	202.7
12:41	4	3	0.0535	807.88	0.6440	0.6300	162.0	166.0	5.0	35.55	177.7	209.4
12:48	5	3	0.0326	629.12	0.3805	0.3700	155.0	163.0	5.0	27.74	138.7	161.5
12:54	6	3	0.0324	629.70	0.3736	0.3700	153.0	168.0	5.0	27.78	138.9	161.3
13:01	7	3	0.0384	686.62	0.4451	0.4400	153.0	170.0	5.0	30.17	150.8	175.1
13:07	8	3	0.0454	732.82	0.5436	0.5500	144.0	147.0	5.0	33.79	168.9	193.3
13:14	9	3	0.0500	768.42	0.6007	0.6100	142.0	146.0	5.0	35.55	177.8	202.7
13:20	10	3	0.0365	656.54	0.4374	0.4300	150.0	146.0	5.0	29.91	149.6	172.8
13:27	11	3	0.0326	627.10	0.3830	0.3700	155.0	159.0	5.0	27.74	138.7	161.5
13:33	12	3	0.0446	733.49	0.5349	0.5200	158.0	159.0	5.0	32.54	162.7	190.5
Time weighting used in averaging. =>				697.33	0.4822	0.4777	150.38	157.69	65.00	31.28	2,032.9	2,350.7

				Run#	2
Sample Volume	V@68 (Pb/29.92)(1-bws/100)		dscf	Vd	1,978.4
Total Flowrate	Oultet Flow		dscf/min	Qs	524,781
Particulate					
Grain loading	0.01543 Wt/Vd		gr/dscf	Cg	0.00083
Emissions	0.00857 Cg Qs		lb/hr	Ct	3.739
LEAD					
Grain loading	0.01543 Lead/Vd		gr/dscf	Cg	9.62E-06
Emissions	0.00857 Cg Qs		lb/hr	Ct	0.04327852995
Avg Sample Rate	V@Tor / t		acf/min	Qan	36.16
Avg Velocity @ Sample Point	vs=Qa/As		fpm	vs	697.33
Avg Orifice temp			°R	Tor	610.05
Avg Stack temp			°R	Ts	617.36
Avg Nozzle Velocity	Qan*Ts / An*Tor		fpm	vn	694.19
% ISOKINETIC	100 vn/vs			%I	99.55

Particulate and Lead Emissions

Plant	Oregon Steel Mills								File	1685	
Source	ICA Baghouse-EAF								Tester	MJE/TJH/CDB	
Date	07-Nov-2001										
Run#	3		Wt(mg)	128 349	Stack Area	As=	969.6	sqft	Mol Wt. Dry	Md=	29.02 molwt
Points	11		Lead(mg)	1.471	Stack Temp.	Tdb=	141	°F	Mol Wt. Wet	Ms=	28.82 molwt
					Stack Temp.	Twb=	84	°F	Barometeric	Pb=	30.50 in H2O
Hivol ID		SN#	1192		Moisture	bws=	1.83	%	Static Pres.	Pstat=	0.01 in H2O
Orifice		A=	47.8947		Nozzle Dia.	Dn=	3.109	in	Stack Pres.	Ps=	30.50 in Hg
Constants		B=	0.4763		Nozzle Area	An=	7.59	sqin	Pitot	Cp=	0.8029

TIME	Compartment POINT #	pt	Velocity Pressure dP inH2O	Correct fpm Vs	Orifice in H2O dHo Calc	Pressure in H2O dHo Act	Temperature (F) Orifice Tor	(F) Stack Ts	Time min t	Rate cfm Standard Q@68°F	Volume cuft Standard @68øF	Orifice @Tor
13:50												
13:57	13	3	0.0426	717.19	0.4935	0.4900	152.0	166.0	5.0	31.78	158.9	184.2
14:04	14	3	0.0423	698.49	0.5123	0.5200	150.0	138.0	5.0	32.74	163.7	189.2
14:11	15	3	0.0352	637.18	0.4210	0.4300	148.0	138.0	5.0	29.96	149.8	172.5
14:19	1	3	0.0396	674.70	0.4781	0.4800	148.0	136.0	5.0	31.57	157.8	181.8
14:26	2	3	0.0460	741.68	0.5439	0.5400	156.0	160.0	5.0	33.18	165.9	193.6
14:33	3	3	0.0483	760.00	0.5631	0.5700	146.0	160.0	5.0	34.32	171.6	196.9
14:41	4	3	0.0480	759.47	0.5658	0.5600	156.0	163.0	5.0	33.76	168.8	197.0
14:48	5	3	0.0313	612.79	0.3642	0.3600	160.0	162.0	5.0	27.27	136.4	160.1
14:55	6	3	0.0430	718.25	0.5115	0.5100	164.0	162.0	5.0	32.09	160.5	189.7
15:03	7	3	0.0371	667.15	0.4339	0.4300	158.0	162.0	5.0	29.73	148.6	174.0
15:10	8	3	0.0337	630.20	0.3977	0.4000	155.0	151.0	5.0	28.79	143.9	167.7
15:17	9	3	0.0327	625.84	0.3758	0.3900	150.0	161.0	5.0	28.55	142.8	164.9
Time weighting used in averaging. =>				686.91	0.4717	0.4733	153.58	154.92	60.00	31.14	1,868.7	2,171.5

			Run#	3
Sample Volume	V@68 (Pb/29.92)(1-bws/100)	dscf	Vd	1,870.0
Total Flowrate	Oultet Flow	dscf/min	Qs	522,453
Particulate				
Grain loading	0.01543 Wt/Vd	gr/dscf	Cg	0.00106
Emissions	0.00857 Cg Qs	lb/hr	Ct	4.743
LEAD				
Grain loading	0.01543 Lead/Vd	gr/dscf	Cg	1.21E-05
Emissions	0.00857 Cg Qs	lb/hr	Ct	0.05434628801
Avg Sample Rate	V@Tor / t	acf/min	Qan	36.19
Avg Velocity @ Sample Point	vs=Qa/As	fpm	vs	686.91
Avg Orifice temp		°R	Tor	613.25
Avg Stack temp		°R	Ts	614.59
Avg Nozzle Velocity	Qan*Ts / An*Tor	fpm	vn	687.99
% ISOKINETIC	100 vn/vs		%I	100.16

Horizon Engineering
13585 NE Whitaker Way
Portland, OR 97230
503/255-5050 FAX 503/255-0505

HIGH VOLUME EMISSION TESTS

Plant: OSM
Source: Baghouse Outlet
Date: 11/7/01 P_b: 30.5
T_{db}: 143 T_{wb}: 85 %H_2O: 1.97 D_n: 3.909
Magn Ranges, DP:0- 1 DH:0-

Leak Rates @ 100%, DH in H_2O

Run #	Pretest	Post-test
1	0 in H_2O	0 in H_2O

Run #	Filter #
Blank	6776163
R1	6776164

Orifice No. 1A2
Cal. No. (0.1) 15.99
(1.0) 47.89

DP's from: Presurvey
During test

Diagram of Outlet

Run #	Process Rate

Run #	Traverse Point	t Sample Time Min.	24 Hour Time	DP Velo Pres "H_2O"	DH Orif Pres "H_2O"	Ts Stack Temp °F	To Orif Temp °F	Notes
1	1	5	1031	0.0392	.46	143	110	
	2	10		0.0248	.28	129	130	
	3	15		0.0361	.42	124	130	
	4	20		0.0615	.73	133	140	
	5	25		0.0456	.54	130	144	
	6	30		.0358	.42	141	132	
	7	35		.0336	.40	146	136	
	8	40		.0310	.37	137	138	
	9	45		.0353	.42	135	136	
	10	50		.0450	.53	148	140	
	11	55		.0509	.60	148	150	
	12	60		.0342	.39	166	148	
	13	65		.0484	.56	168	152	
	14	70	1205	.0528	.62	198	142	
	~~15~~	~~75~~		~~.0327~~	~~.36~~	~~172~~		

*****Horizon Engineering*****

13585 NE Whitaker Way
Portland, OR 97230
503/255-5050 FAX 503/255-0505

HIGH VOLUME EMISSION TESTS

Plant: OSM
Source: Baghouse Outlet
Date: 11/7/01 P_b: 30.5
T_{db}: 137 T_{wb}: 98 %H_2O: _____ D_n: 3.109
Magn Ranges, DP:0- 1 DH:0- _____

Leak Rates @ 100%, DH in H_2O

Run #	Pretest	Post-test
2	2 in H_2O	0 in H_2O

Run #	Filter #	
2	6776159	Orifice No. 1192
		Cal. No. (0.1) 15.97
		(1.0) 47.99

DP's from: Presurvey _____
During test _____

Diagram of Outlet

Run #	Process Rate

Run #	Traverse Point	t Sample Time Min.	24 Hour Time	DP Velo Pres "H_2O"	DH Orif Pres "H_2O"	Ts Stack Temp °F	To Orif Temp °F	Notes
2	~~0~~	~~5~~		~~.0295~~	~~.45~~	~~137~~		
	15	5	1209	.0286	.34	137	132	
	1	10		.0432	.50	167	150	
	2	15		.0412	.48	161	150	
	3	20		.0508	.60	161	151	
	4	25		.0535	.63	166	162	
	5	30		.0326	.37	163	155	
	6	35		.0324	.37	168	153	
	7	40		.0384	.44	170	153	
	8	45		.0454	.55	147	144	
	9	50		.0500	.61	146	142	
	10	55		.0365	.43	146	150	
	11	60		.0326	.37	159	155	
	12	65	1333	.0446	.52	159	158	

*****Horizon Engineering*****

13585 NE Whitaker Way
Portland, OR 97230
503/255-5050 FAX 503/255-0505

HIGH VOLUME EMISSION TESTS

Plant: OSM
Source: Baghouse Outlet
Date: 11 7 01 P_b: 30.5
T_{db}: 141 T_{wb}: 84 %H_2O: ____ D_n: 3.109
Magn Ranges, DP:0- 1 DH:0- ____
Leak Rates @ 100%, DH in H_2O

Run #	Pretest	Post-test
3	0 in H_2O	0 in H_2O
Blank #2	0 in H_2O	0 in H_2O

Run #	Filter #
3	G 276161
Blank #2	G 276160

Orifice No. 1192
Cal. No. (0.1) 15.99
(1.0) 47.89

DP's from: Presurvey ____
During test ____

. Diagram of Outlet

Run #	Process Rate
____	____
____	____

Run #	Traverse Point	t Sample Time Min.	24 Hour Time	DP Velo Pres "H_2O"	DH Orif Pres "H_2O"	Ts Stack Temp °F	To Orif Temp °F	Notes
3	13	5	1350	.0426	.49	166	152	
	14	10		.0423	.52	138	150	
	15	15		.0352	.43	138	148	
	1	20		.0396	.48	136	148	
	2	25		.0460	.54	160	156	
	3	30		.0483	.57	160	146	
	4	35		.0480	.56	163	156	
	5	40		.0313	.36	162	166	
	6	45		.0430	.51	162	164	
	7	50		.0371	.43	162	158	
	8	55		.0337	.40	151	155	
	9	60	1517	.0327	.39	161	150	
	10	65		~~.0269~~	~~.31~~	~~164~~		
	11	70						

Blank Correction and Filter Rinse Allocation

Oregon Steel Mills	Plant					1685	0.00%
ICA Baghouse-EAF	Source					Tester	0.00%
07-Nov-2001	Date						

PARTICULATE RUN I.D.	FILTER #	Filter Sample Wt mg	Wt less Filter Blank mg	Fraction of total	Rinse Residue Contribution mg	Filter Residue Contribution mg	TOTAL mg
1	6776164	85.6	85.1	29.56%	13.479	0.000	98.579
2	6776159	92.5	92.0	31.96%	14.572	0.000	106.572
3	6776161	111.3	110.8	38.49%	17.549	0.000	128.349
	TOTALS	289.40	287.90	100.00%	45.600	0.000	333.500

Runs 1, 2, & 3				
Sampler rinse residue		715 ml	45.60 mg	
Blank Acetone		275 ml	-0.10 mg	
Blank correct residue			45.60 mg	
Sampler filter residue	999		0.0000 mg	System Blank
Blank correct residue			0.0000 mg	
Blank Filter	6776163/60		0.50 mg	Lab Blank

*LEAD RUN I.D.	FILTER #	Filter Sample Wt mg	Wt less Filter Blank mg (Corrected)	Fraction of total	Rinse Residue Contribution mg	Filter Residue Contribution mg	TOTAL mg
1	6776164	1.0500	1.0445	29.39%	0.0814	0.0000	1.1259
2	6776159	1.1500	1.1445	32.21%	0.0892	0.0000	1.2337
3	6776161	1.3700	1.3645	38.40%	0.1063	0.0000	1.4708
	TOTALS	3.5700	3.5535	100.00%	0.2768	0.0000	3.8303

Runs 1, 2, & 3				
Sampler rinse residue		715 ml	0.2790 mg	
Blank Acetone		275 ml	0.0008 mg	
Blank correct residue			0.2768 mg	
Sampler filter residue	999		0.0000 mg	System Blank
Blank correct residue			0.0000 mg	
Blank Filter	6776163/60		0.0055 mg	Lab Blank

ANTECH

Analysis/Technology

11-28-01

Mr. David Rossman
HORIZON ENGINEERING
13585 NE Whitaker
Portland OR 97220

November 26, 2001 — Identification: OSM (Horizon # 1685)
Job# 0131400-06 — Received: 11/10/01

Sample #	31400	31404
Identification	OSM Baghouse Rinse (Runs 1-3)	OSM blanks
Front acetone rinse:		
Volume (mls)	715	275
Residue (g)	0.0456	-0.0001

Sample #	31401	31402	31403	31405	31406
Identification	Baghouse Run 1	Baghouse Run 2	Baghouse Run 3	#1 blank	#2 blank
Filters: numbers	6776164	6776159	6776161	6776163	6776160
Residue (g)	0.0856	0.0925	0.1113	0.0009	0.0001

Respectfully submitted:
ANTECH

Diana Tracy
president

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

ANTECH
SAMPLE DATA: EPA 315 RESIDUES
Analyst: MJ reviewer:
Job# 31400-06 Identification: 0500 1638

HOUSE BLANKS:

	ACETONE:		IMPINGER [illegible]ER:		DCM:	
Sample #	3					
Sample ID						
vol mark						
Date/time						
Into dessicator						
Vol(mls)		date/time weighed		[illegible]/time weighed		date/time weighed
GWt1(g)						
GWt2(g)						
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average						
Tare (g)						
Net (g)						

	FILTER:		FILTER:		EMPTY:	
Sample #			lab blank			
Sample ID			2776162			
vol mark						
Date/time						
Into dessicator						
Vol(mls)		date/time weighed		date/time weighed		date/time weighed
GWt1(g)			4.2242	11-15 9A		
GWt2(g)			4.2233	11-16 9A		
GWt3(g)			4.2239	11-19 11A		
GWt4(g)			4.2237	11-20 9A		
GWt5(g)						
GWt6(g)						
Average			4.2238			
Tare (g)			4.2241			
Net (g)			-.0003			

ANTECH
SAMPLE DATA: EPA RESIDUES
Analyst: [illegible] reviewer: _____
Job# 31400-06 Identification: OSM # 1638

FRONT ACETONE:

Sample #	31409					
Sample ID	Bagham R1-3					
vol mark	✓✓					
Date/time	11/14 9:50P					
Into dessicator						
Vol(mls)	715	date/time weighed		date/time weighed		date/time weighed
GWt1(g)	141.5161	11-15 9A				
GWt2(g)	141.5156	11-16 9A				
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	141.5159					
Tare (g)	141.4703	11/13 3:50P				
Net (g)	.0456					

BACK ACETONE:

Sample #						
Sample ID						
vol mark						
Date/time						
Into dessicator						
Vol(mls)		date/time weighed		date/time weighed		date/time weighed
GWt1(g)						
GWt2(g)						
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average						
Tare (g)						
Net (g)						

ANTECH
SAMPLE DATA: EPA 315 RESIDUES
Analyst: MJS reviewer:
Job# 31400-06 Identification: OSM 1638

BLANKS:

	ACETONE:		IMPINGER WATER:		DCM:	
Sample #	31404					
Sample ID	OSM-All runs					
vol mark	✓					
Date/time	11/14 9:50P					
Into dessicator						
Vol(mls)	275	date/time weighed		date/time weighed		date/time weighed
GWt1(g)	116.1804	11-15 9A				
GWt2(g)	116.1803	11-16 9A				
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	116.1804					
Tare (g)	116.1805	11/13 3:50P				
Net (g)	-.0001					

	FILTER:		FILTER:			
Sample #	31405		31406		314..	
Sample ID	Blank #1		Blank #2		EMPTY	
filter #	6776163		6776160			
Date/time	11/11 9:00A		11/11 9:00A		11/14 9:50P	
Into dessicator						
Vol(mls)		date/time weighed		date/time weighed		date/time weighed
GWt1(g)	4.2089		4.2028	4-15 9A		11-15 9A
GWt2(g)	4.2081	11-16 9A	4.2023	4-16 9A	107.8569	11-16 9A
GWt3(g)	4.2088	11-19 11A	4.2024	4-19 11A		
GWt4(g)	4.2089	11-20 9A				
GWt5(g)						
GWt6(g)						
Average	4.2089		4.2024		107.8570	
Tare (g)	4.2080	10-24-01	4.2023	6-1-01	107.8575	11/13 3:50P
Net (g)	.0009		.0001		-.0005	

ANTECH
SAMPLE DATA: EPA RESIDUES (page 3)

FLTERS:

Sample #	31401	31402	31403
Sample ID	BHR1 6776164	BH R2 6776159	BH R3 6776161
Date/time	11/11/01 9:00A	11/11/01 9:00A	11/11/01 9:00A
In dessicator			

		Date/time		Date/time		Date/time
GWt1(g)	4.2953	11-15 9A	4.3149	11-15 9A	4.3277	11-15 9A
GWt2(g)	4.2945	11-16 9A	4.3139	11-16 9A	4.3265	11-16 9A
GWt3(g)	4.2941	11-18 11A	4.3140	11-19 11A	4.3267	11-19 11A
GWt4(g)						
Average	4.2944		4.3140		4.3266	
Tare (g)	4.2088	10-24-01	4.2215	6-3-01	4.2153	6-1-01
Net (g)	.0856		.0925		.1113	

FILTERS:

Sample #			
Sample ID			
Date/time			
In dessicator			

		Date/time		Date/time		Date/time
GWt1(g)						
GWt2(g)						
GWt3(g)						
GWt4(g)						
Average						
Tare (g)						
Net (g)						

QC DATA:

Date/time	11-13	11-15	11-16	11-18	11-19	11-20
Balance calibrated	✓	✓	✓	✓	✓	✓
(NTIS cert wts)	✓	✓	✓	✓	✓	✓
Date/time		9A	11P	1P	10A	8A
Temp/temp		69/63	72/63	68/61	68/61	67/59
Relative humidity (%)		76	61	67	67	62

ANALYTICAL BALANCE CALIBRATION FORM

Balance name Sartorius Number _____

Classification of standard weights _____

Date	0.5000 g	1.0000 g	10.0000 g	50.0000 g	100.0000 g	Analyst
9-17-01	0.1000g	1.0000g			100.0000g	[illegible]
9-18-01	0.0999g	1.0001g			100.0001g	[illegible]
9-19-01	0.1000g	1.0001g			100.0001g	[illegible]
9-20-01	0.0999g	1.0001g			100.0001g	[illegible]
9-23-01	0.1000g	1.0001g			100.0000g	[illegible]
9-24-01	0.1000g	1.0000g			100.0000g	[illegible]
9-25-01	0.1000g	1.0000g			100.0001g	[illegible]
9-26-01	0.1001g	1.0000g			100.0001g	[illegible]
9-27-01	0.1000g	1.0001g			100.0001g	[illegible]
9-28-01	0.0999g	1.0000g			100.0001g	[illegible]
10-18-01	0.0999g	1.0000g			100.0000g	[illegible]
10-21-01	0.0999g	.9999g			100.0000g	[illegible]
10-25-01	0.0999g	1.0000g			100.0000g	[illegible]
11-15-01	0.0999g	1.0000g			100.0000g	[illegible]
11-16-01	0.1000g	1.0000g			100.0000g	[illegible]
11-19-01	0.0999g	0.9999g			100.0000g	[illegible]
11-20-01	0.1000g	1.0000g			100.0000g	[illegible]

ANALYTICAL BALANCE CALIBRATION FORM

Balance name Sartorius Number _____

Classification of standard weights _____

Date	0.500 g	1.0000 g	10.0000 g	50.0000 g	100.0000 g	Analyst
9-26-01	0.0999 g	1.0000 g			100.0000 g	[illegible]
9-28-01	0.1000 g	1.0000 g			100.0001 g	[illegible]
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
[illegible]	0.0999 g	1.0001 g			[illegible]	[illegible]
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
[illegible]	0.0999 g	1.0000 g			100.0001 g	[illegible]
10-1-01	0.1000 g	1.0000 g			100.0001 g	[illegible]
10-5-01	0.1000 g	1.0000 g			100.0001 g	[illegible]
[illegible]	0.1000 g	[illegible]			[illegible]	[illegible]
[illegible]	0.1000 g	1.0000 g			[illegible]	[illegible]
10-8-01	0.1000 g	1.0001 g			100.0001 g	[illegible]
[illegible]	[illegible]	1.0000 g			[illegible]	[illegible]
10-16-01	0.0999 g	1.0000 g			100.0001 g	[illegible]
10-17-01	0.0999 g	1.0000 g			100.0000 g	[illegible]
10-21-01	0.1000	1.0000 g			[illegible]	[illegible]
[illegible]	0.0999 g	1.0001 g			100.0001 g	[illegible]
10-23-01	0.1000 g	1.0001 g			[illegible]	[illegible]
[illegible]	0.1000 g	1.0001 g			100.0001 g	[illegible]
[illegible]	0.0999	1.0001 g			100.0001 g	[illegible]
[illegible]	0.0997 g	1.0001 g			100.0001 g	[illegible]
[illegible]	0.1000 g	1.0000 g			[illegible]	[illegible]
10-29-01	0.1000 g	1.0000 g			[illegible]	[illegible]
10-30-01	0.1000 g	1.0000 g			100.0001 g	DLT
10-31-01	0.1000 g	1.0000 g			100.0001 g	DLT
11-1-01	0.1000 g	1.0000 g			100.0000 g	DLT
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
[illegible]	[illegible]	[illegible]			100.0000 g	DLT
[illegible]	[illegible]	[illegible]			100.0000 g	DLT
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
11-13-01	0.1000 g	1.0000 g			[illegible]	[illegible]
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]
11-16-01	0.1000 g	1.0001 g			[illegible]	[illegible]
11-18-01	0.1000 g	1.0001 g			100.0000 g	[illegible]

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

Date Sent to Lab: 11/8/01

Chain of Custody Form

Client: CSM

Horizon Job No.: 1685

Field Personnel Contact: Mike Eisele

Source: Baghouse

Office Contact: Kate K

Laboratory: Antech 501 N. E. Thompson Mill Rd. Corbett, Oregon 97019	Antech Job No.:	Return Samples to Horizon ASAP for Further Analysis? (Yes) / No	Rush Normal X

Sample I. D.	Date Sampled	Acetone	Filter					
Run	11/7/01	✓						
Run 1	11/7/01		✓					
Run 2	11/7/01		✓					
Run 3	11/7/01		✓					
Run								
Run								
Run								
Run								
Run								
Run								
Run								
Run								
Blank	11/7/01	✓						
Blank	11/7/01		✓					
Blank	11/7/01		✓					
Blank								

Relinquished by: Signature/ Date/ Time	Received by: Signature/ Date/ Time	Relinquished by: Signature/ Date/ Time	Received by: Signature/ Date/ Time

Horizon Target

These filters are stored in the desiccator.

	5-31-01	6-1-01	6-3-01	6-4-01
6776137	4.2798	4.2805	4.2801	
138	4.2596	4.2602	4.2595	4.2597
139	4.2361	4.2375	4.2362	4.2363
140	4.2577	4.2585	4.2577	4.2576
141	4.2556	4.2571	4.2557	4.2558
6776142	4.2596	4.2603	4.2595	4.2598
143	4.2384	4.2391	4.2382	4.2384
144	4.2341	4.2349	4.2348	
145	4.2225	4.2233	4.2227	4.2222
146	4.2308	4.2314	4.2310	
6776147	4.2549	4.2555	4.2552	
148	4.2321	4.2335	4.2330	
149	4.2392	4.2399	4.2397	
150	4.2342	4.2398	4.2398	
151	4.2329	4.2334		
6776152	4.2251	4.2259	4.2257	
153	4.2224	4.2232	4.2228	
154	4.2045	4.2051	4.2051	
155	4.2268	4.2279	4.2278	
156	4.2307	4.2314	4.2314	
6776157	4.2271	4.2278	4.2278	
158	4.2387	4.2389	4.2386	
✓159	4.2210	4.2215	4.2215	
✓160	4.2026	4.2023		
✓161	4.2179	4.2153		

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

Horizon Hires

These filters are kept in the Accounting

	10-18-01	10-24-01	10-25-01
~~6776163~~	~~4.2061~~	~~4.2082~~	
~~164~~	~~4.2090~~	~~4.2088~~	
165	4.2709	4.2404	
166	4.2224	4.2223	
167	4.2286	4.2290	
6776168	4.2261	4.2259	
169	4.1966	4.1966	
170	4.1837	4.1835	
171	4.2647	4.2645	
172	4.2580	4.2581	
6776173	4.2680	4.2679	
174	4.2340	4.2337	
175	4.2230	4.2229	
176	4.2462	4.2458	
177	4.2396	4.2400	
6776178	4.2336	4.2338	
179	4.2233	4.2234	
180	4.2248	4.2248	
181	4.2192	4.2192	
182	4.2388	4.2383	
6776183	4.2263	4.2266	
184	4.2059	4.2056	
6856209	4.2988	4.2980	4.2983
202	4.3266	4.3268	
203	4.3183	4.3181	
6856204	4.3160	4.3160	
205	4.3176	4.3176	
206	4.3775	4.3775	
207	4.3876	4.3874	
208	4.3307	4.3308	
6856209	4.2982	4.2982	
210	4.3124	4.3122	
211	4.3089	4.3088	
212	4.2979	4.2976	
213	4.3405	4.3403	
6856214	4.3669	4.3672	
215	4.3529	4.3530	
216	4.3478	4.3478	
217	4.3120	4.3108	
218	4.3454	4.3452	

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

Environmental Services Laboratory, Inc.

E S L

17400 SW Upper Boones Ferry Road, Suite 270 • Portland, OR 97224 • (503) 670-8520

December 07, 2001

Nichole Karl
Horizon Engineering
13585 NE Whitaker Way
Portland, OR 97230
TEL: (503) 255-5050
FAX (503) 255-0505

RE: 1685 Audit/ OSM Audit Samples Order No.: 0111195

Dear Nichole Karl,

Environmental Services Laboratory received 8 samples on 11/26/01 for the analyses presented in the following report.

The Samples were analyzed for the following tests:
ICP Metals (EPA 6010B)

There were no analytical problems encountered, and all data met laboratory QC criteria, unless noted in a Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval of the Laboratory.
The following checked data sections are included in this report, and numbered to indicate total pages within each report section.

✓Base Sample Report ✓Method Blank Report __Sample Duplicate Report
__Matrix Spike/Matrix Spike Duplicate Report ✓Laboratory Control Spike/Spike Duplicate Report __Continuing Calibration Verification Report ✓Initial Calibration Verification Report

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Leslie Rush
Project Manager

Keith Hunter
Technical Review

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	Filter Run 1(6776164)
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-01A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	1.050	0.500		ug	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	Filter Run 2(6776159)
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-02A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: *lmr*
Lead	1.150	0.500		ug	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	Filter Run 3(6776161)
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-03A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	1,370	0.500		ug	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	Filter blank 1(6776163)
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-04A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	3.30	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	Filter blank 2(6776160)
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-05A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	7.70	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	31400 Acetone rinse
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-06A	**Matrix:**	SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	279	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	31404 Acetone blank
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-07A	**Matrix:**	SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	0.840	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	314 Lab blank
Lab Order:	0111195	**Tag Number:**	
Project:	1685 Audit/ OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111195-08A	**Matrix:**	SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	ND	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: 07-Dec-01

CLIENT: Horizon Engineering
Work Order: 0111195
Project: 1685 Audit/ OSM Audit Samples

QC SUMMARY REPORT
Method Blank

Sample ID: MB-3578 Batch ID: 3578 Test Code: EPA 6010B Units: mg/Kg Analysis Date: 12/3/01 Prep Date: 11/30/01

Client ID: 0111195 Run ID: ICP_011203A SeqNo: 98967

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

CLIENT: Horizon Engineering
Work Order: 0111195
Project: 1685 Audit/ OSM Audit Samples

Date: *07-Dec-01*

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS-3578** Batch ID: **3578** Test Code: **EPA 6010B** Units: **mg/Kg** Analysis Date: **12/3/01** Prep Date: **11/30/01**

Client ID: **0111195** Run ID: **ICP_011203A** SeqNo: **98968**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	49.4	1	50	0	98.8%	80	120	0			

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT: Horizon Engineering
Work Order: 0111195
Project: 1685 Audit/ OSM Audit Samples

QC SUMMARY REPORT
Minerals ICV for ICP

Sample ID: ICVHI	Batch ID: 3578	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/3/01	Prep Date 11/30/01
Client ID	0111195	Run ID: ICP_011203A		SeqNo: 98965	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.98	0.005	10	0	99.8%	90	110	0			

Sample ID: ICVLOW	Batch ID: 3578	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/3/01	Prep Date: 11/30/01
Client ID	0111195	Run ID: ICP_011203A		SeqNo: 98965	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	.513	0.005	0.5	0	102.6%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

TO: ESL

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

CHAIN OF CUSTODY REPORT

Work Order # [redacted]

REPORT TO: Horizon Engineering
ATTENTION: Mike Wallace
ADDRESS: 13585 NE Whitaker Way
Portland, OR 97230
PHONE: 503-255-5050 FAX: 503-255-0505
PROJECT NAME: OSM
PROJECT NUMBER: 1685
SAMPLED BY:

INVOICE TO: Horizon Engineering
ATTENTION: Penny Rossman
ADDRESS: same
P.O. NUMBER:
QUOTE #

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: [X] 7 5 4 3 2 1 Same Day
Fuels & Hydrocarbon Analyses: 5 3-4 2 1 Same Day
OTHER Specify
* Turnaround Requests less than standard may incur Rush Charges

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	[redacted]	Analysis Request: lead	MATRIX (W, S, A, O)	# OF CONTAINERS	COMMENTS
1 Filter Run 1 (6776164)			X			
2 Filter Run 2 (6776159)			X			
3 Filter Run 3 (6776161)			X			
4 Filter blank 1 (6776163)			X			
5 Filter blank 2 (6776160)			X			
6 31400 Acetone rinse			X			
7 31404 Acetone blank			X			
8 314 lab blank			X			
9						
10						

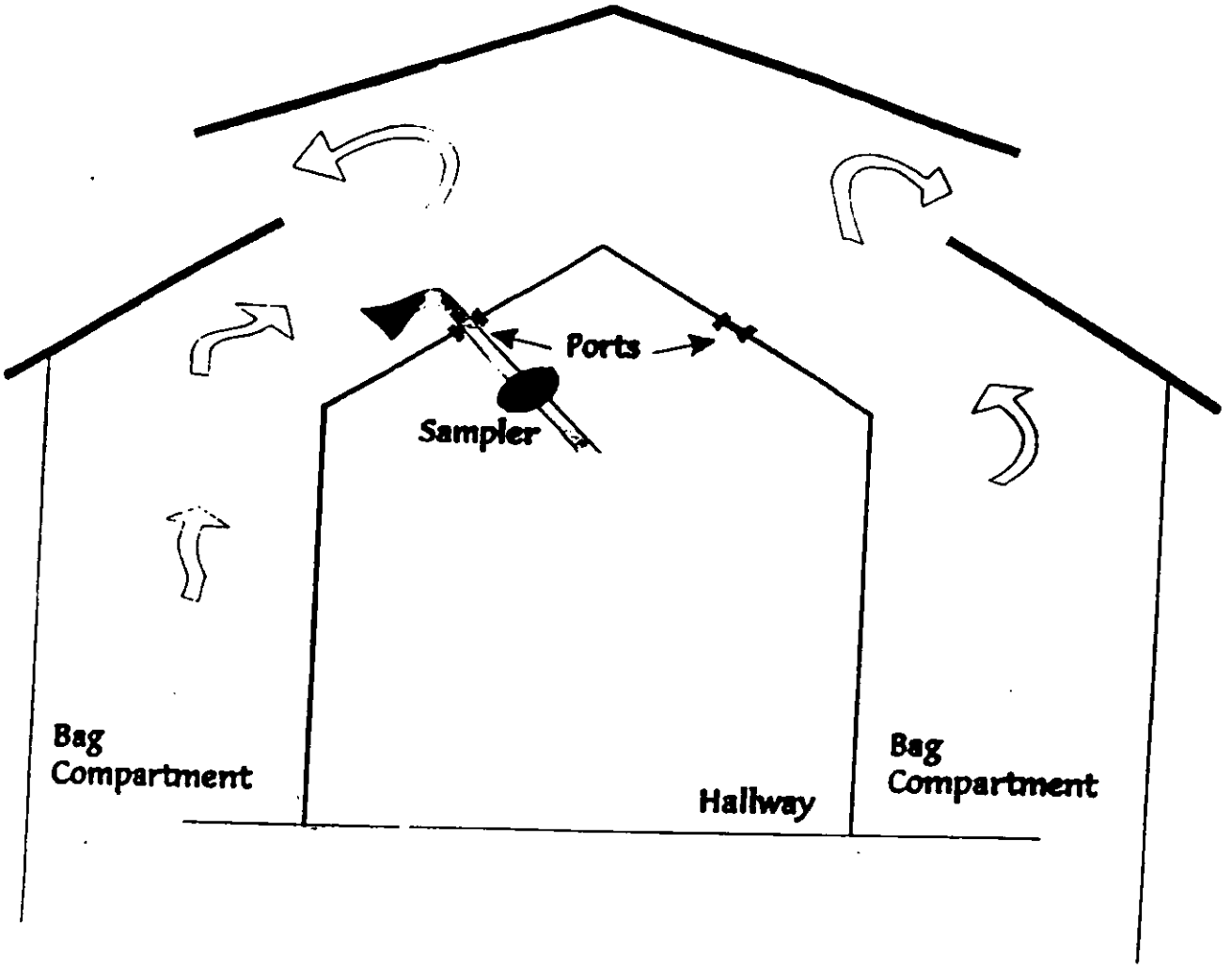
RELINQUISHED BY: Nichole Karl DATE: 11/20/01
PRINT NAME: Nichole Karl FIRM: horizon TIME:
RECEIVED BY: [signature] DATE: 11/21/01
PRINT NAME: S MACLEOD FIRM: ESL TIME: 1302

RELINQUISHED BY: DATE:
PRINT NAME: FIRM: TIME:
RECEIVED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL REMARKS: Analysis by EPA 6010 (ICP). Digest complete filters, reporting units should be (ug). Please analyze audit samples at the same time. Similar to previous ESL job # 0101063 Please call if you have any questions

12/11/2001 10:02 FAX 013

Baghouse Sampling Diagram



.....Horizon Engineering.....

Volume Flow Rate Determination

Flow Rate Determinations and Field Data

Traverse Point Location – Inlet & Outlet

Outlet Flow Rate Determination

Client	Oregon Steel Mills	Compart	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16		
Source	BOA Baghouse-EAF	Point									HI-VOL RUN #1										
Location	Portland OR	K	0.0363	0.0061	0.0087	0.0173	0.0308	0.0160	0.0213	0.0023	A	0.0268	0.0177	0.0190	0.0302	0.0392	0.0392	*0.017*			
Date	07-Nov-2001	L	0.0352	0.0160	0.0270	0.0620	0.0484	0.0374	0.0271	0.0374	B	0.0291	0.0343	0.0452	0.0388	0.0630	0.0406	*0.020*			
Testers	MJET/JH/CDB	*M	0.0381	0.0270	0.0322	0.0592	0.0407	0.0382	0.0342	0.0187	*C	0.0286	0.0380	0.0528	0.0421	0.0592	0.0429	*0.019*			
File	1685	N	0.0468	0.0389	0.0481	0.0675	0.0512	0.0451	0.0426	0.0352	D	0.0357	0.0478	0.0535	0.0394	0.0493	0.0510	*0.035*			
Analysis QA	MEW	O	0.0396	0.0355	0.0643	0.1015	0.0570	0.0424	0.0427	0.0615	E	0.0561	0.0871	0.0839	0.0205	0.0512	0.0902	*0.0492*			
Equipment	ShortRidge,Hs	K									A										
Total Runs	Run #1	L									B										
Pts per Run		*M									*C										
		N									D										
		O									E										
All Points	SQRT(dP)	0.1953	0.1977	0.1509	0.1820	0.2404	0.2125	0.1867	0.1817	0.1627		0.1858	0.2054	0.2202	0.1835	0.2281	0.2266	*0.1655*		0.1953	
Standard Deviation	STD(SQRT(dP))	0.1018	0.0991	0.0816	0.0987	0.1277	0.1074	0.0959	0.0924	0.0943		0.0948	0.1093	0.1154	0.0932	0.1148	0.1164	*0.0863*		0.1018	
Symbol	Definitions, Units	Method/Notes	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	Avg/Total	14.0625
	Time																			15	Compart
As	Cross Section	in²	9.308	9.308	9.308	9.308	9.308	9.308	9.308	9.308		9.308	9.308	9.308	9.308	9.308	9.308	*9.308*			
Cp	Pitot Coef		0.8029	0.8029	0.8029	0.8029	0.8029	0.8029	0.8029	0.8029		0.8029	0.8029	0.8029	0.8029	0.8029	0.8029	*0.8029*			
Ts	Duct temperature	°F	143.0	129.0	124.0	133.0	130.0	141.0	146.0	137.0		135.0	148.0	148.0	166.0	168.0	148.0	*137.0*		142.2	
Ts	Duct temperature	°R	602.7	588.7	583.7	592.7	589.7	600.7	605.7	596.7		594.7	607.7	607.7	625.7	627.7	607.7	*596.7*			
Tdb	Dry bulb temp	°F	143.0																		
Twb	Wet bulb temp	°F	85.0																		
Pbar	Barometric Pressure	in Hg	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50		30.50	30.50	30.50	30.50	30.50	30.50	*30.50*			
Pg	Static Pressure	in H2O	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		0.04	0.04	0.04	0.04	0.04	0.04	*0.04*			
Ps	Duct Pressure	in Hg	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50		30.50	30.50	30.50	30.50	30.50	30.50	*30.50*			
dp^½			0.1977	0.1509	0.1820	0.2404	0.2125	0.1867	0.1817	0.1627		0.1858	0.2054	0.2202	0.1835	0.2281	0.2266	*0.1655*			
Bws	Moisture, % Stack		1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91		1.91	1.91	1.91	1.91	1.91	1.91	*1.91*			
mfg	Mole fraction dry gas		98.1%	98.1%	98.1%	98.1%	98.1%	98.1%	98.1%	98.1%		98.1%	98.1%	98.1%	98.1%	98.1%	98.1%	*98.1%*			
Oxygen	Outlet-Estimated		20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62		20.62	20.62	20.62	20.62	20.62	20.62	*20.62*			
Carbon Dioxide	Outlet-Estimated		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		0.40	0.40	0.40	0.40	0.40	0.40	*0.40*			
Md	Molecular weight Dry		29.01	29.01	29.01	29.01	29.01	29.01	29.01	29.01		29.01	29.01	29.01	29.01	29.01	29.01	*29.01*			
Ms	Molecular weight Wet		28.80	28.80	28.80	28.80	28.80	28.80	28.80	28.80		28.80	28.80	28.80	28.80	28.80	28.80	*28.80*			
Va	Velocity stack	fpm	674.5	508.8	610.9	813.4	716.9	635.9	621.4	552.4		629.7	703.5	754.4	637.9	794.2	776.0	*561.9*		666.1	
Qa	Flowrate actual	acf/min	43,600.6	32,887.5	39,490.6	52,577.5	46,338.3	41,104.3	40,166.5	35,705.7		40,705.7	45,476.0	48,763.7	41,232.2	51,334.1	50,162.6	*36,319.3*		43,058	605,498
Qsd (5-pt)	Flowrate @std	dscf/min	38,173.1	29,478.5	35,700.3	46,809.4	41,464.6	36,107.5	34,992.4	31,575.5		36,118.1	39,487.6	42,342.4	34,772.6	43,154.0	43,557.1	*32,115.1*		37,721	530,486
	Average Flow During Hi-vol testing																				

* High volume sampler tested these points (in BOLD)

Outlet Flow Rate Determination

Client	Oregon Steel Mills	Compart	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16		
Source	ICA Baghouse-EAF	Point										HI-VOL RUN #2									
Location	Portland, OR	K	0 0376	0 0297	0 0420	0 0304	0 0130	0 0280	0 0207	0 0239	A	0 0332	0 0192	0 0195	0 0349	*0 0452*	*0 0392*	0 0178			
Date	07-Nov-2001	L	0 0390	0 0356	0 0440	0 0511	0 0262	0 0283	0 0363	0 0302	B	0 0457	0 0268	0 0277	0 0295	*0 0326*	*0 0406*	0 0207			
Testers	MJE/TJH/CDB	*M	0 0337	0 0348	0 0262	0 0416	0 0362	0 0324	0 0339	0 0375	*C	0 0342	0 0275	0 0226	0 0406	*0 0332*	*0 0429*	0 0195			
File	1685	N	0 0422	0 0338	0 0537	0 0812	0 0408	0 0336	0 0411	0 0428	D	0 0513	0 0342	0 0292	0 0629	*0 0491*	*0 0510*	0 0357			
Analysis/QA	MEW	O	0 0635	0 0720	0 0882	0 0633	0 0467	0 0396	0 0602	0 0928	E	0 0858	0 0748	0 0642	0 0550	*0 0528*	*0 0902*	0 0492			
Equipment	ShortRidge,11s	K									A										
Total Runs	Run #2	L									B										
Pts per Run		*M									*C										
		N									D										
		O									E										
All Points	SQRT(dP)	0 2000	0.2065	0.1999	0.2211	0 2282	0 1768	0.1796	0.1933	0.2067		0 2201	0 1853	0.1761	0.2091	*0.2053*	*0.2266*	0 1655		0 2000	
Standard Deviation	STD(SQRT(dP))	0 1032	0.1046	0 1029	0.1149	0.1172	0 0920	0 0902	0 0994	0.1097		0 1136	0 0983	0.0925	0 1066	*0.103"*	*0.1164*	0 0863		0 1032	
Symbol	Definitions, Units	Method/Notes	1	2	3	4	5	6	7	8		9	10	11	12	*13*	*14*	15	16	Avg/Total	14 0625
	Time																			15	Compart
As	Cross Section	in²	9,308	9,308	9,308	9,308	9,308	9,308	9,308	9,308		9,308	9,308	9,308	9,308	*9,308*	*9,308*	9,308			
Cp	Pitot Coef		0 8029	0 8029	0 8029	0 8029	0 8029	0 8029	0 8029	0 8029		0 8029	0 8029	0 8029	0 8029	*0 8029*	*0 8029*	0 8029			
Ts	Duct temperature	°F	167 0	161.0	161.0	166 0	163.0	168.0	170 0	147.0		146 0	146 0	159 0	159 0	*166.0*	*148.0*	137.0		157 6	
Ts	Duct temperature	°R	626 7	620.7	620.7	625.7	622.7	627.7	629.7	606.7		605 7	605 7	618 7	618 7	*625.7*	*607.7*	596 7			
Tdb	Dry bulb temp	°F	137 0																		
Twb	Wet bulb temp	°F	98 0																		
Pbar	Barometric Pressure	in Hg	30 50	30.50	30.50	30.50	30.50	30.50	30.50	30 50		30 50	30.50	30 50	30.50	*30.50*	*30.50*	30 50			
Pg	Static Pressure	in H2O	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			
Ps	Duct Pressure	in Hg	30 50	30 50	30.50	30 50	30.50	30.50	30.50	30.50		30 50	30 50	30.50	30.50	*30.50*	*30.50*	30 50			
dp^½			0 2065	0 1999	0.2211	0.2282	0.1768	0.1796	0.1933	0 2067		0 2201	0 1853	0.1761	0 2091	*0.2053*	*0.2266*	0 1655			
Bws	Moisture, % Stack		4 52	4.52	4.52	4.52	4.52	4.52	4.52	4.52		4.52	4.52	4.52	4 52	*4.52*	*4.52*	4 52			
mfg	Mole fraction dry gas		95.5%	95.5%	95.5%	95.5%	95.5%	95.5%	95.5%	95.5%		95.5%	95 5%	95.5%	95.5%	*95.5%*	*95.5%*	95 5%			
Oxygen	Outlet-Estimated		20.58	20 58	20 58	20.58	20 58	20.58	20 58	20 58		20 58	20 58	20.58	20 58	*20 58*	*20 58*	20 58			
Carbon Dioxide	Outlet-Estimated		0 47	0 47	0 47	0 47	0 47	0 47	0 47	0 47		0 47	0 47	0 47	0 47	*0 47*	*0 47*	0 47			
Md	Molecular weight Dry		29 02	29 02	29 02	29 02	29 02	29.02	29 02	29.02		29 02	29 02	29.02	29 02	*29 02*	*29 02*	29 02			
Ms	Molecular weight Wet		28 52	28.52	28.52	28.52	28.52	28.52	28.52	28.52		28 52	28.52	28.52	28 52	*28 52*	*28 52*	28 52			
vs	Velocity stack	fpm	721 7	695 6	769 0	797 0	616 2	628 2	677.4	710 9		756 3	636 8	611.7	726.2	*71".2*	*"9.8*	564 6		693 9	
Qa	Flowrate actual	acf/min	46,653.1	44,961.1	49,707 6	51,516 6	39,830 6	40,606 2	43,785.1	45,953.9		48,883.2	41,162.0	39,542.1	46,938 0	*46,360.7*	*50,40".6*	36,496 7		44,854	630,754
Qsd (5-pt)	Flowrate @std	dscf/min	38,234.1	37,203 6	41,131.2	42,287.4	32,852.4	33,225.4	35,712.7	38,902 6		41,450.8	34,903 6	32,825.4	38,965 0	*38,055.2*	*42,602."*	31,414 4		37,318	524,781
	Average Flow During Hi-vol testing																				

* High volume sampler tested these points (in BOLD)

Outlet Flow Rate Determination

Client	Oregon Steel Mills	Compart Point	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16		
Source	ICA Baghouse-EAF										HI-VOL RUN #3										
Location	Portland, OR	K	0 0312	0 0371	0 0371	0 0328	0 0344	0 0277	0 0351	0 0137	A	0 0113	*0 0116*	*0 0195*	*0 0349*	0 0452	0 0191	0 0175			
Date	07-Nov-2001	L	0 0302	0 0352	0 0452	0 0312	0 0337	0 0303	0 0352	0 0283	B	0 0339	*0 0265*	*0 02[illegible]*	*0 0295*	0 0326	0 0438	0 03o3			
Testers	MJE/TJH CDB	*M	0 0373	0 0424	0 0421	0 0420	0 0267	0 0474	0 0378	0 0291	*C	0 0373	*0 0285*	*0 0226*	*0 0406*	0 0332	0 0377	0 0339			
File	1685	N	0 0472	0 0555	0 0534	0 0553	0 0323	0 0542	0 0422	0 0445	D	0 0418	*0 0324*	*0 0292*	*0 0629*	0 0491	0 0490	0 0436			
Analysis QA	MEW	O	0 0519	0 0596	0 0636	0 0787	0 0292	0 0552	0 0352	0 0529	E	0 0393	*0 0354*	*0 0642*	*0 0550*	0 0528	0 0618	0 0448			
Equipment	ShortRidge, IIs	K									A										
Total Runs	Run #3	L									B										
Pts per Run		*M									*C										
		N									D										
		O									E										
All Points	SQRT(dP)	0 1944	0 1977	0 2132	0 2187	0 2157	0 1766	0 2052	0 1925	0.1794		0 1772	*0 1615*	*0 1761*	*0 2091*	0 2053	0 2023	0 1855		0 1944	
Standard Deviation	STD(SQRT(dP))	0 0994	0 1000	0 1078	0 1104	0 1112	0 0885	0 1047	0 0964	0 0938		0 0922	*0 0832*	*0 0925*	*0 1066*	0 1037	0 1044	0 0949		0 0994	
Symbol	Definitions, Units	Method/Notes	1	2	3	4	5	6	7	8		9	*10*	*11*	*12*	13	14	15	16	Avg/Total	14 0625
	Time																			15	Compart
As	Cross Section	in²	9,308	9,308	9,308	9,308	9,308	9,308	9,308	9,308		9,308	*9,308*	*9,308*	*9,308*	9,308	9,308	9,308			
Cp	Pitot Coef		0 8029	0 8029	0 8029	0 8029	0 8029	0 8029	0 8029	0 8029		0 8029	*0 8029*	*0 8029*	*0 8029*	0 8029	0 8029	0 8029			
Ts	Duct temperature	°F	136 0	160 0	160 0	163.0	162 0	162 0	162.0	151.0		161 0	*164.0*	*159.0*	*159.0*	166 0	138 0	138 0		156.1	
Ts	Duct temperature	°R	595.7	619.7	619.7	622.7	621 7	621.7	621.7	610 7		620.7	*623.[illegible]*	*618.[illegible]*	*618.[illegible]*	625.7	597.7	597 7			
Tdb	Dry bulb temp	°F	141 0																		
Twb	Wet bulb temp.	°F	84.0																		
Pbar	Barometric Pressure	in Hg	30 50	30 50	30 50	30 50	30.50	30.50	30.50	30.50		30 50	*30.50*	*30 50*	*30 50*	30 50	30 50	30 50			
Pg	Static Pressure	in H2O	0 01	0 01	0.01	0 01	0 01	0.01	0.01	0 01		0 01	*0 01*	*0 01*	*0 01*	0 01	0 01	0 01			
Ps	Duct Pressure	in Hg	30 50	30 50	30 50	30 50	30.50	30.50	30.50	30 50		30 50	*30 50*	*30 50*	*30 50*	30 50	30 50	30 50			
dp^½			0 1977	0 2132	0 2187	0 2157	0 1766	0 2052	0.1925	0 1794		0 1772	*0 1615*	*0 1761*	*0 2091*	0 2053	0 2023	0 1855			
Bws	Moisture, % Stack		1 83	1 83	1.83	1.83	1.83	1.83	1.83	1.83		1 83	*1.83*	*1.83*	*1.83*	1 83	1.83	1 83			
mfg	Mole fraction dry gas		98 2%	98.2%	98 2%	98 2%	98.2%	98 2%	98.2%	98.2%		98.2%	*98.2%*	*98.2%*	*98.2%*	98 2%	98.2%	98 2%			
Oxygen	Outlet-Estimated		20 61	20 61	20 61	20 61	20 61	20.61	20 61	20 61		20 61	*20.61*	*20.61*	*20 61*	20 61	20 61	20 61			
Carbon Dioxide	Outlet-Estimated		0 46	0 46	0 46	0 46	0 46	0 46	0 46	0 46		0 46	*0 46*	*0 46*	*0 46*	0 46	0 46	0 46			
Md	Molecular weight Dry		29 02	29.02	29 02	29.02	29 02	29 02	29.02	29 02		29 02	*29.02*	*29.02*	*29.02*	29 02	29 02	29 02			
Ms	Molecular weight Wet		28 82	28 82	28.82	28 82	28 82	28.82	28.82	28.82		28 82	*28.82*	*28.82*	*28.82*	28 82	28 82	28 82			
vs	Velocity stack	fpm	670 4	737.2	756.4	747.6	611.7	710.7	666.7	615 7		613 4	*560.3*	*608.6*	*722.4*	713 5	687.1	629 9		670 1	
Qa	Flowrate actual	act/min	43,332 5	47,649 8	48,893.4	48,326 0	39,541 0	45,940 7	43,095.5	39,800 2		39,652 1	*36,214.3*	*39,338.9*	*46,696 8*	46,122 4	44,414 5	40,717 3		43,316	609,127
Qsd (5-pt)	Flowrate @std	dscf/min	38,414 6	40,605 8	41,665.5	40,983.7	33,587.3	39,023.4	36,606 6	34,416.5		33,736 0	*30,662.9*	*33,5[illegible]*	*39,858.1*	38,927 3	39,242 0	35,975 4		37,152	522,453
	Average Flow During Hi-vol testing																				

* High volume sampler tested these points (in BOLD)

Inlet Flow Rate Determination

Client	Oregon Steel Mills	Compartment
Source	EAF Baghouse INLET	Point
Location	Portland, OR	
Date	07-Nov-2001	
Testers	MJE/TJH/CDB	
File	1685	
Analysis/QA	MEW	
Equipment	ShortRidge #2.pitot 14	
Total Runs	2	
Pts per Run	48	

	Pre-test				Post-Test			
	dP (inH2O)	Ts (°F)	dP (inH2O)	Ts (°F)	dP (inH2O)	Ts (°F)	dP (inH2O)	Ts (°F)
1	1.9310	na	2.5280	na	1.4460	na	2.3840	na
2	1.8160	na	2.3310	na	1.5850	na	1.5680	na
3	1.8070	na	2.0890	na	1.5460	na	1.4240	na
4	2.0110	na	2.5850	na	1.3370	na	1.8360	na
5	1.9830	na	2.5450	na	1.6230	na	2.3140	na
6	1.9680	na	2.4990	na	1.9090	na	2.0890	na
7	1.9240	na	2.4750	na	1.5210	na	2.2170	na
8	1.2860	na	2.5220	na	1.4840	na	1.6570	na
9	1.7780	na	2.6850	na	1.2260	na	2.1340	na
10	1.4420	na	2.3380	na	1.2560	na	1.8200	na
11	1.4500	na	1.8420	na	1.3480	na	2.0460	na
12	1.2990	na	2.0850	na	2.0160	na	1.8150	na
13	2.3330	na	2.1250	na	2.1670	na	1.5960	na
14	2.3450	na	2.0510	na	2.3300	na	1.3260	na
15	2.4040	na	1.9520	na	2.4080	na	1.7700	na
16	2.6280	na	1.6260	na	2.2150	na	1.2500	na
17	2.2770	na	1.9780	na	2.6950	na	1.5900	na
18	2.9890	na	2.3570	na	2.1530	na	1.4700	na
19	2.6280	na	2.0780	na	2.6940	na	1.5400	na
20	2.6130	na	2.5070	na	2.4360	na	1.7870	na
21	2.6580	na	2.4340	na	2.4760	na	1.7750	na
22	3.0220	na	2.4080	na	2.2940	na	1.8880	na
23	2.6840	na	2.4890	na	2.6330	na	1.9970	na
24	2.2980	na	2.3180	na	2.7820	na	1.9140	na
All Points SQRT(dP)	1.4824	sqrt(dP)	0.0	(°F)	1.3666	sqrt(dP)	0.0	(°F)

Symbol	Definitions, Units	Method/Notes	Pre-test	Post-Test	Average
	Time		09:50	15:20	
As	Cross Section	in²	13,685	13,685	
Cp	Pitot Coef.		0.8237	0.8237	
Ts	Duct temperature	°F	162.0	212.0	187.0
Twb	Duct temperature	°F	88.0	109.0	
Ts	Duct temperature	°R	621.7	671.7	
Pbar	Barometric Pressure	in Hg	30.25	30.25	
Pg	Static Pressure	in H2O	*-16.00*	*-7.00*	
Ps	Duct Pressure	in Hg	29.07	29.74	
dp^½			1.4824	1.3666	
Bws	Moisture, % Stack	(inlet)	1.95	4.85	3.40
Bws	Moisture, % Stack	(outlet)	1.91	1.83	1.87
mfg	Mole fraction dry gas		98.1%	95.1%	
Md (inlet)	Molecular weight Dry		29.03	29.03	
Ms (inlet)	Molecular weight Wet		28.82	28.50	
vs	Velocity stack	fpm	5,395	5,141	5,268
Qa	Flowrate actual	acf/min	512,722	488,535	500,628
Qsd (Inlet)	Flowrate @std	dscf/min	414,631	362,910	388,771
Qsd(Outlet)	Flowrate @std	dscf/min			525,906
	Difference	(Out-In)/In			35.3%

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VOLUME FLOWRATE MEASUREMENT

Plant OSM
Sampling Location Baghouse Outlet
Test Conditions NoAmal
Date 11/7/01 Time
Duct Dimensions
Duct Area in²
Gauge I.D. SR2 in H2O By RJH
Post Test Leak Check ✓ 0 in H2O

Cyclonic Flow ? Yes__ No X Avg Null Angle ____
P_o = Barometric Pressure 30.5 in Hg
C_p = Pitot Coefficient 0.8294
Pitot I.D. 115

Run #	1									
Time	1015									
Pt 1	0.0363		5 1	0.0308		9 1	.0268		13 - 1	.0392
2	0.0352	143 F	2	.0284	130 F	2	.0291		2	.0330
3	0.0381		3	.0407		3	.0286		3	.0592
4	0.0468		4	.0512		4	.0357		4	.0493
5	0.0396	.0392	5	.0570	.0456	5	.0561	.0353	5	.0512 .04
2 1	.0061		6 1	.0160		10 1	.0177		14 1	.0392
2	.0160		2	.0374		2	.0343		2	.0406
3	.0276	129 F	3	.0382		3	.0380		3	.0429
4	.0389		4	.0451		4	.0478		4	.0510
5	.0358	.0249	5	.0424	.0258	5	.0871	.0450	5	.0902 .05
3 1	.0087		7 1	.0213		11 1	.0190			
2	.0270		2	.0271		2	.0152			
3	.0322	124 F	3	.0342		3	.0528			
4	.0481		4	.0426		4	.0535			
5	.0643	.0361	5	.0427	.0336	5	.0839	.0509		
4 1	.0173		8 1	.0623		12 1	.0802			
2	.0620		2	.0374		2	.0389			
3	.0592	133 F	3	.0187		3	.0421			
4	.0675		4	.0352		4	.0394			
5	.1015	.0615	5	.0615	.0310	5	.0205	.0342		
Avg √ΔP										

Symbol	Definition, Units	Method/Equation	Run 1	Run 2	Run 3	Average
T_{db}	Dry bulb temp., °F		143			
T_{wb}	Wet bulb temp., °F		85			
P_{stat}	Static press., in H_2O		-0.6441			
T_s	Duct temp., °R	T_{db} + 460				
P_s	Duct press., in H_g	P_o ± Pstat/13.6				
S		Avg √ΔP x √ T_s				
mv	% H_2O in gas stream	Psychrometry				
md	Mole fraction dry gas	1.00 - mv/100				
Md	Molecular weight of dry gas	Gas analysis				
Ms	Molecular wt of act. gas	Ms = mdMd + 18 (1-md)				
Vs	Velocity, fpm	Vs = 5125s (1/PsMs)$^{1/2}$ (Cp)				
qa	Actual flowrate, acfm	qa = VsAs/144				
qs	Flowrate @ std cond, scfm	qs = 0.123 VsAs md Ps / Ts				

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VOLUME FLOWRATE MEASUREMENT

Plant OSM
Sampling Location Baghouse Outlet
Test Conditions Normal
Date 11/7/01 Time
Duct Dimensions
Duct Area in^2
Gauge I.D. SR 2 in H20 By JTJ
Post Test Leak Check ✓ 0 in H20

Cyclonic Flow ? Yes__ No X Avg Null Angle ____
P_o = Barometric Pressure 30.5 in Hg
C_p = Pitot Coefficient 0.86294
Pitot I.D. 11 - S

Run #	2										
Time	1159										
Pt 1	.0143		3 1	.0420		7 1	.0207		11 1	.0195
2	.0371		2	.0440		2	.0363		2	.0277
3	.0362		3	.0262		3	.0339		3	.0226
4	.0493		4	.0537		4	.0411		4	.0292
5	.0528	.0377	5	.0882	.0508	5	.0602	.0364	5	.0642
VS 1	.0178		4 1	.0304		8 1	.0239		R 1	.0349
2	.0207		2	.0511		2	.0302		2	.0295
3	.0195		3	.0416		3	.0375		3	.0406
4	.0357		4	.0812		4	.0428		4	.0629
5	.0492	.0286	5	.0633	.0535	5	.0928	.0454	5	.0556
1 - 1	.0376		5 1	.0130		9 1	.0332			
2	.0390		2	.0262		2	.0457			
3	.0337		3	.0362		3	.0342			
4	.0422		4	.0409		4	.0513			
5	.0635	.0432	5	.0467	.0326	5	.0858	0.0500		
2 1	.0297		6 1	.0280		10 1	.0192			
2	.0356		2	.0283		2	.0268			
3	.0348		3	.0324		3	.0275			
4	.0338		4	.0336		4	.0342			
5	.0720	.0412	5	.0396	.0324	5	.0748	.0365		
Avg $\sqrt{\Delta P}$										

Symbol	Definition, Units	Method/Equation	Run 1	Run 2	Run 3	Average
T_{db}	Dry bulb temp., °F		137			
T_{wb}	Wet bulb temp., °F		98			
P_{stat}	Static press., in H_2O		0.348			
T_s	Duct temp., °R	T_{db} + 460				
P_s	Duct press., in H_g	$P_o \pm P_{stat}/13.6$				
S		Avg $\sqrt{\Delta P} \times \sqrt{T_s}$				
mv	% H_2O in gas stream	Psychrometry				
md	Mole fraction dry gas	1.00 - mv/100				
Md	Molecular weight of dry gas	Gas analysis				
Ms	Molecular wt of act. gas	Ms = mdMd + 18 (1-md)				
Vs	Velocity, fpm	Vs = 5125s $(1/P_sM_s)^{1/2}$ (Cp)				
qa	Actual flowrate, acfm	qa = VsAs/144				
qs	Flowrate @ std cond, scfm	qs = 0.123 VsAs md Ps / Ts				

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VOLUME FLOWRATE MEASUREMENT

Plant OSM
Sampling Location Baghouse Outlet
Test Conditions Normal
Date 11/7/01 Time
Duct Dimensions
Duct Area in²
Gauge I.D. SR 2 in H20 By TJH
Post Test Leak Check ✓ 0 in H2O

Cyclonic Flow ? Yes__ No X Avg Null Angle ____
P_o = Barometric Pressure 30.5 in Hg
C_p = Pitot Coefficient 0.80294
Pitot I.D. 11-5

Run #	3									
Time										
13 1	.0452		21	.0371		61	.0277		1	.0116
2	.0326		2	.0352		2	.0303		2	.0265
3	.0332		3	.0424		3	.0474		3	.0285
4	.0491		4	.0555		4	.0542		4	.0324
5	.0526	.0426	5	.0596	.0460	5	.0552	.0430	5	.0354
14 1	.0191		22 1	.0371		7 1	.0351			
2	.0438		2	.0452		2	.0362			
3	.0377		3	.0421		3	.0378			
4	.0490		4	.0534		4	.0422			
5	.0619	.0423	5	.0636	.0483	5	.0352	.0371		
15 1	.0175		23 1	.0329		8 1	.0137			
2	.0363		2	.0312		2	.0283			
3	.0339		3	.0420		3	.0291			
4	.0436		4	.0553		4	.0445			
5	.0479	.0352	5	.0787	.0480	5	.0529	.0337		
16 1	.0312		24 1	.0344		9 1	.0113			
2	.0302		2	.0337		2	.0339			
3	.0373		3	.0267		3	.0373			
4	.0472		4	.0323		4	.0418			
5	.0619	.0396	5	.0292	.0313	5	.0393	.0327		
Avg $\sqrt{\Delta P}$										

Symbol	Definition, Units	Method/Equation	Run 1	Run 2	Run 3	Average
T_{db}	Dry bulb temp., °F					
T_{wb}	Wet bulb temp., °F					
P_{stat}	Static press., in H_2O		.0132			
T_s	Duct temp., °R	T_{db} + 460				
P_s	Duct press., in H_g	$P_o \pm$ Pstat/13.6				
S		Avg $\sqrt{\Delta P} \times \sqrt{T_s}$				
mv	% H_2O in gas stream	Psychrometry				
md	Mole fraction dry gas	1.00 - mv/100				
Md	Molecular weight of dry gas	Gas analysis				
Ms	Molecular wt of act. gas	Ms = mdMd + 18 (1-md)				
Vs	Velocity, fpm	$Vs = 5125s\ (1/PsMs)^{1/2}\ (Cp)$				
qa	Actual flowrate, acfm	qa = VsAs/144				
qs	Flowrate @ std cond, scfm	qs = 0.123 VsAs md Ps / Ts				

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VOLUME FLOWRATE MEASUREMENT

Plant OSM
Sampling Location Bag house INlet start of
Test Conditions Normal
Date 11/7/01 Time
Duct Dimensions
Duct Area in²
Gauge I.D. S2#2 in H2O By RSS / BBG
Post Test Leak Check 0.4 H2O (max

Cyclonic Flow ? Yes__ No X Avg Null Angle ____
P_o = Barometric Pressure 30.25 in Hg
C_p = Pitot Coefficient 0.82367
Pitot I.D. 14-S

Run #	1	start of runs								
Time	950									
Pt 1	1,931	22	3,622	19	2,078					
2	1,816	23	2,684	20	2,507					
3	1,807	24	2,298	21	2,434					
4	2,011	1	2,528	22	2,408					
5	1,983	2	2,331	23	2,489					
6	1,968	3	2,089	24	2,318					
7	1,924	4	2,585							
8	1,286	5	2,545							
9	1,778	6	2,499							
10	1,442	7	2,475							
11	1,460	8	2,522							
12	1,299	9	2,695							
13	2,339	10	2,838							
14	2,345	11	1,842							
15	2,404	12	2,085							
16	2,628	13	2,125							
17	2,277	14	2,051							
18	2,989	15	1,952							
19	2,628	16	1,626							
20	2,613	17	1,978							
21	2,658	18	2,357							
Avg $\sqrt{\Delta P}$										

Symbol	Definition, Units	Method/Equation	Run 1	Run 2	Run 3	Average
T_{db}	Dry bulb temp., °F		162			
T_{wb}	Wet bulb temp., °F		98			
P_{stat}	Static press., in H_2O		-16			
T_s	Duct temp., °R	T_{db} + 460				
P_s	Duct press., in H_g	$P_o \pm$ Pstat/13.6				
S		Avg $\sqrt{\Delta P}$ x $\sqrt{T_s}$				
mv	% H_2O in gas stream	Psychrometry				
md	Mole fraction dry gas	1.00 - mv/100				
Md	Molecular weight of dry gas	Gas analysis				
Ms	Molecular wt of act. gas	Ms = mdMd + 18 (1-md)				
Vs	Velocity, fpm	Vs = 5126s $(1/PsMs)^{1/2}$ (Cp)				
qa	Actual flowrate, acfm	qa = VsAs/144				
qs	Flowrate @ std cond, scfm	qs = 0.123 VsAs md Ps / Ts				

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VOLUME FLOWRATE MEASUREMENT

Plant OSM
Sampling Location Baghouse Inlet End Of Run
Test Conditions 12-1201
Date 11.7.01 Time
Duct Dimensions
Duct Area in^2
Gauge I.D. SR2 in H2O By BAG
Post Test Leak Check 0 in H_2O

Cyclonic Flow ? Yes__ No X Avg Null Angle ____
P_o = Barometric Pressure 30.5 in Hg
C_p = Pitot Coefficient 0.82367
Pitot I.D. 14 S

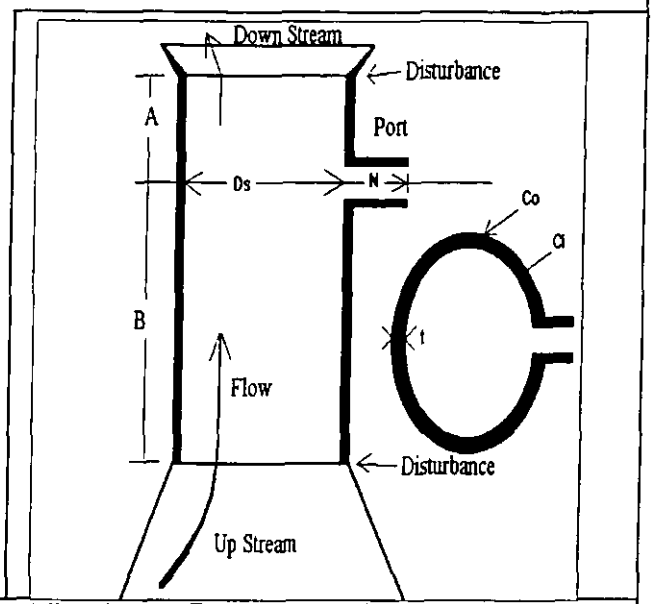
Run #	End of Runs									
Time	1520									
Pt /										
1	1.446		21	2.476		41	1.590			
2	1.585		22	2.294		42	1.470			
3	1.546		23	2.653		43	1.540			
4	1.337		24	2.792		44	1.787			
5	1.623		25	2.384		45	1.775			
6	1.909		26	1.668		46	1.888			
7	1.521		27	1.424		47	1.997			
8	1.484		28	1.836		48	1.914			
9	1.226		29	2.314						
10	1.256		30	2.089						
11	1.348		31	2.217						
12	2.016		32	1.657						
13	2.167		33	2.134						
14	2.330		34	1.820						
15	2.408		35	2.046						
16	2.215		36	1.815						
17	2.695		37	1.696						
18	2.153		38	1.326						
19	2.694		39	1.770						
20	2.436		40	1.250						
Avg √ΔP										

Symbol	Definition, Units	Method/Equation	Run 1	Run 2	Run 3	Average
T_{db}	Dry bulb temp., °F			212		
T_{wb}	Wet bulb temp., °F			109		
P_{stat}	Static press., in H_2O					
T_s	Duct temp., °R	T_{db} + 460				
P_s	Duct press., in Hg	P_o ± Pstat/13.6				
S		Avg √ΔP x √T_s				
mv	% H_2O in gas stream	Psychrometry				
md	Mole fraction dry gas	1.00 - mv/100				
Md	Molecular weight of dry gas	Gas analysis				
Ms	Molecular wt of act. gas	Ms = mdMd + 18 (1-md)				
Vs	Velocity, fpm	Vs = 5125s (1/PsMs)$^{1/2}$ (Cp)				
qa	Actual flowrate, acfm	qa = VsAs/144				
qs	Flowrate @ std cond, scfm	qs = 0.123 VsAs md Ps / Ts				

Traverse Point Location

Client	Oregon Steel Mills			Portland, OR	Date
Location	Portland, OR			MJE/TJH/CDB	By
EPA Method #1	Baghouse Inlet			1685	File

Outer Circumference	(ft) [Co]		'
Wall thickness	(in) [t]		"
Inner Circumference	(ft) [Ci]		'
INSIDE of FAR WALL to OUTSIDE of Nipple	(in) [F]	134.00	"
INSIDE of NEAR WALL to OUTSIDE of Nipple	(in) [N]	2.00	"
DOWNstream Disturb	(in) [A]	128.0	"
UPstream Disturb	(in) [B]	516.0	"
Inner Diameter	(in) [Ds]	132.00	"
Area	(sqin) [As]	13,685	
DOWNstream Ratio	[A/Ds]	1.0	
UPstream Ratio	[B/Ds]	3.91	
Traverse (Particulate)		24	
Recommended #Pts/Diameter		12	
Traverse (NON-Particulate)		16	
Recommended #Pts/Diameter		8	
Actual Points per Diameter		24	



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	1.05%	132.0	1.4	1.375	1.375	3.375	3 3 / 8
2	3.23%	132.0	4.3	4.250	4.250	6.250	6 1 / 4
3	5.51%	132.0	7.3	7.250	7.250	9.250	9 1 / 4
4	7.92%	132.0	10.5	10.500	10.500	12.500	12 1 / 2
5	10.47%	132.0	13.8	13.875	13.875	15.875	15 7 / 8
6	13.20%	132.0	17.4	17.375	17.375	19.375	19 3 / 8
7	16.15%	132.0	21.3	21.375	21.375	23.375	23 3 / 8
8	19.38%	132.0	25.6	25.625	25.625	27.625	27 5 / 8
9	23.00%	132.0	30.4	30.375	30.375	32.375	32 3 / 8
10	27.18%	132.0	35.9	35.875	35.875	37.875	37 7 / 8
11	32.32%	132.0	42.7	42.625	42.625	44.625	44 5 / 8
12	39.79%	132.0	52.5	52.500	52.500	54.500	54 1 / 2
13	60.21%	132.0	79.5	79.500	79.500	81.500	81 1 / 2
14	67.68%	132.0	89.3	89.375	89.375	91.375	91 3 / 8
15	72.82%	132.0	96.1	96.125	96.125	98.125	98 1 / 8
16	77.00%	132.0	101.6	101.625	101.625	103.625	103 5 / 8
17	80.62%	132.0	106.4	106.375	106.375	108.375	108 3 / 8
18	83.85%	132.0	110.7	110.625	110.625	112.625	112 5 / 8
19	86.80%	132.0	114.6	114.625	114.625	116.625	116 5 / 8
20	89.53%	132.0	118.2	118.125	118.125	120.125	120 1 / 8
21	92.08%	132.0	121.5	121.500	121.500	123.500	123 1 / 2
22	94.49%	132.0	124.7	124.750	124.750	126.750	126 3 / 4
23	96.77%	132.0	127.7	127.750	127.750	129.750	129 3 / 4
24	98.95%	132.0	130.6	130.625	130.625	132.625	132 5 / 8

Traverse Point Location

Client	Oregon Steel Mills			Portland, OR	Date
Location	Portland, OR			MJE/TJH/CDB	By
EPA Method #1	Outlet			1685	File
Number of PORTS	P	#	5		
INSIDE of FAR WALL to OUTSIDE of Nipple	F	in	52.0		
INSIDE of NEAR WALL to OUTSIDE of Nipple	N		0.00		
Stack/Duct WIDTH	Dw	in	179.0		
DOWNstream Disturb	A	in			
UPstream Disturb	B	in			
Stack/Duct DEPTH	Dh	in	52.0		
Equivalent Diameter	De	in	80.6		
Area	As	sqin	9308.0		
DOWNstream Ratio	A/De		0.00		
UPstream Ratio	B/De		0.00		
Traverse (Particulate)			25		
Recommended #Pts/Port		5	5		
Traverse (NON-Particulate)			16		
Recommended #Pts/Port		3	4		
Actual Points used per Port			5		
Actual Number of Points			25		

Trav Pt #No	Fract Depth (f)	Stack Depth (Dp)	Actual Points (Dpxf)	Nearest 8ths (TP)	Adjusted Points (TP)	Traverse Points (TP+N)	Traverse Points (TP+N)
1	10.00%	52.0	5.2	5.250	5.250	5.250	5 1 / 4
2	30.00%	52.0	15.6	15.625	15.625	15.625	15 5 / 8
3	50.00%	52.0	26.0	26.000	26.000	26.000	26
4	70.00%	52.0	36.4	36.375	36.375	36.375	36 3 / 8
5	90.00%	52.0	46.8	46.750	46.750	46.750	46 3 / 4

Visible Emission Data

Field Data

Certifications

HORIZON ENGINEERING

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www.horizonengineering.com

RUN 1

SOURCE INFORMATION	
Company Name	OSM
Address	Portland OR
Phone #	

VISIBLE EMISSION OBSERVATION FORM

OBSERVATION RECORD	
DATE	11/7/01 TIME: Start 11:12 End 11:18

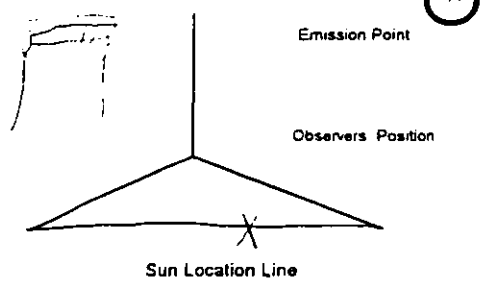
Source Description	ID #
EAF	
Operating Mode/Output Rate	
Normal | Max	
Control Equipment	Operating Mode
Baghouse	Normal

PLUME INFORMATION	@ Start	@ End
Emission Point Description	Metal	–
Height Above Ground	75'	–
Height Relative to Observer	70'	–
Distance from Observer	300'	–
Direction from Observer	Northwest	–
Plume Type: Continuous	Yes	–
Intermittent	–	–
Fugitive	–	–
Plume Color	–	–
Water Droplets Present?	NO	–
Attached Plume?	–	–
Detached Plume?	–	–
Point in the Plume at Which Opacity was Observed	Top of BH	–
Description of Background	Sky	–
Color of Background	Blue	–
Condition of Sky	Clear	–
Wind Speed (mph)	0-3	–
Wind Direction (from)	South	–
Ambient Temperature (°F)	55	–
Relative Humidity (Pb)	> 50%	–

MIN	Seconds 0	15	30	45	MIN	Seconds 0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0				37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Source Layout Sketch

Draw North Arrow



Range of Opacity Readings	Max	%
	Min	%
Number of Readings Above ____ %		
Average Opacity for ___ Readings =		%

Observer's Name (print)	Certification No.
Mike Eisele	1224
Organization: Horizon Engineering, Portland, Oregon	

Certified By: ODEQ	Date:
Observer's Signature: Mike Eisele	Date: 11/7/01

Comments

HORIZON ENGINEERING
13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 255-9050 • Fax (503) 255-0505
www.horizonengineering.com

RUN 2

VISIBLE EMISSION OBSERVATION FORM

SOURCE INFORMATION	
Company Name	OSM
Address	Portland OR
Phone #	

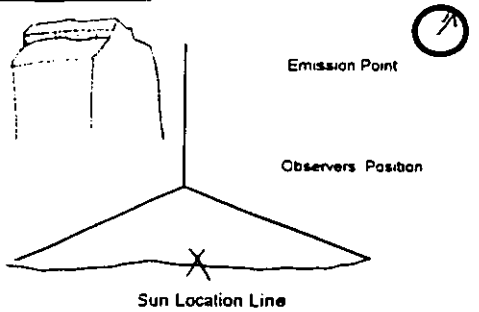
OBSERVATION RECORD			
DATE 11/7/01	TIME:	Start 1219	End 1275

Source Description	ID #
EAF	
Operating Mode/Output Rate: Normal Max	
Control Equipment: Baghouse	Operating Mode: Normal

PLUME INFORMATION	@ Start	@ End
Emission Point Description	Metal	–
Height Above Ground	75'	–
Height Relative to Observer	70'	–
Distance from Observer	300'	–
Direction from Observer	NW	–
Plume Type: Continuous	yes	–
Intermittent	–	–
Fugitive	–	–
Plume Color	–	–
Water Droplets Present?	NO	–
Attached Plume?	–	/
Detached Plume?	–	/
Point in the Plume at Which Opacity was Observed	TOP of BH	/
Description of Background	SKY	/
Color of Background	Blue	/
Condition of Sky	Clear	/
Wind Speed (MPH)	Calm	/
Wind Direction (from)	–	/
Ambient Temperature (°F)	55	/
Relative Humidity (%)	750%	/

Seconds					Seconds				
MIN	0	15	30	45	MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0				37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Source Layout Sketch



Range of Opacity Readings	Max	____ %
	Min	____ %
Number of Readings Above ____ %		
Average Opacity for ___ Readings =		____ %

Observer's Name (print)	Certification No.
Mike E. Sole	1224
Organization: Horizon Engineering, Portland, Oregon	

Certified By: ODEQ	Date:
Observer's Signature: Mike E. Sole	Date: 11/7/01

Comments

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Phone (503) 255-6060 • Fax (503) 255-0505
www.horizonengineering.com

RUN 3

VISIBLE EMISSION OBSERVATION FORM

SOURCE INFORMATION	
Company Name	OSM
Address	Portland OR
Phone #	

OBSERVATION RECORD			
DATE 11/7/01	TIME:	Start 1409	End 1415

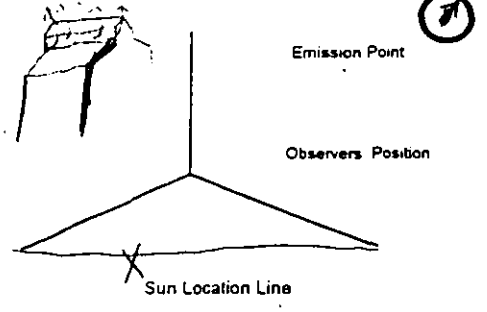
Source Description	ID #
EAF	
Operating Mode/Output Rate	
Normal Max	
Control Equipment	Operating Mode
Baghouse	Normal

PLUME INFORMATION	@ Start	@ End
Emission Point Description	Metal	–
Height Above Ground	75'	–
Height Relative to Observer	10'	–
Distance from Observer	300	–
Direction from Observer	NW	–
Plume Type: Continuous	Yes	–
Intermittent	–	–
Fugitive	–	–
Plume Color	–	–
Water Droplets Present?	NO	–
Attached Plume?	–	–
Detached Plume?	–	–
Point in the Plume at Which Opacity was Observed	Top of Baghouse	–
Description of Background	sky	–
Color of Background	Blue	–
Condition of Sky	clear	–
Wind Speed ( )	Calm	–
Wind Direction (from)	–	–
Ambient Temperature(°F)	60	–
Relative Humidity(Pb)	50%	–

Seconds					Seconds				
MIN	0	15	30	45	MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0				37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Source Layout Sketch

Draw North Arrow



Range of Opacity Readings	Max	%
	Min	%
Number of Readings Above ___%		
Average Opacity for ___ Readings =		%

Observer's Name (print)	Certification No.
Mike Eisele	1224
Organization: Horizon Engineering, Portland, Oregon	

Certified By: ODEQ	Date:
Observer's Signature:	Date: 11/17/01

Comments

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

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY CONTROL DIVISION

CERTIFICATION OF COMPLETION

PLUME EVALUATION TRAINING

Michael Eisele

CERTIFICATION NO. 1224 EXPIRATION DATE 3/29/2002

Mary M Abrams
ADMINISTRATOR

Gaseous Emissions

Gaseous Emissions Determinations

Molecular Weight Determinations

Analyzer Calibration Data, Manual Data

Bias Checks

Data Logger Gas Charts

Strip Charts

Gaseous Emissions

Client	Oregon Steel Mills	MJE/TJH/CDB		Testers
Source	ICA Baghouse-EAF Inlet	1685		File
Location	Portland, OR	MEW		Analysis/QA
Date	07-Nov-2001			

Number of Completed Runs Date Tested			Combined	Run 1	Run 2	Run 3	Average
System Calibration Time - Initial		Tci	08:35	08:35	08:35	08:35	
Test Time-Starting		Tts	10:31	10:31	12:09	13:50	
Test Time-Ending		Tte	15:14	12:05	13:33	15:17	
System Calibration Time - Final		Tcf	15:20	15:20	15:20	15:20	
Test Mid-point Time		Tx	12:52	11:18	12:51	14:33	
Volumetric Flowrate, Dry Standard	dscf/min	Qsd	388,771	388,771	388,771	388,771	
Production	Tons/hr		138.2	137.4	139.4	137.8	138.2
Oxygen	%	O2	20.51	20.51	20.45	20.49	
Carbon Dioxide	%	CO2	0.55	0.55	0.53	0.62	
Carbon Monoxide	CO	Span	1,000	1,000	1,000	1,000	
Indicated average - Dry	ppmv	Cid	143.1	198.0	133.7	123.6	151.8
Cylinder Value - High Range calibration gas	ppmv	Cma	880.0	880.0	880.0	880.0	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.0	0.0	0.0	0.0	
System Calibration Response - High Range gas - Initia	ppmv	Cmi	857.4	857.4	857.4	857.4	
System Calibration Response - Low Range gas - Initial	ppmv	Coi	-0.8	-0.8	-0.8	-0.8	
System Calibration Response - Low Range gas - Final	ppmv	Cof	-0.9	-0.9	-0.9	-0.9	
System Calibration Response - High Range gas - Final	ppmv	Cmf	883.3	883.3	883.3	883.3	
Actual average - Dry (Corrected for Drift)	ppmv-CO	Cgas	144.8	201.5	135.4	124.3	153.7
Mass Emissions	lbm / hr	Mgas	245.6	341.6	229.6	210.8	260.7
Mass Emissions on Production Basis	lbm/Ton		1.777	2.487	1.647	1.530	1.888
Nitrogen Oxides	NOx	Span	250	250	250	250	
Indicated average-Dry	ppmv	Cid	10.22	10.88	11.53	10.15	10.85
Cylinder Value - High Range calibration gas	ppmv	Cma	89.80	89.80	89.80	89.80	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initia	ppmv	Cmi	88.29	88.29	88.29	88.29	
System Calibration Response - Low Range gas - Initial	ppmv	Coi	0.48	0.48	0.48	0.48	
System Calibration Response - Low Range gas - Final	ppmv	Cof	-0.17	-0.17	-0.17	-0.17	
System Calibration Response - High Range gas - Final	ppmv	Cmf	86.46	86.46	86.46	86.46	
Actual average - Dry (Corrected for Drift)	ppmv-NO2	Cgas	10.47	10.96	11.82	10.60	11.13
Mass Emissions	lbm-NO2 / hr	Mgas	29.17	30.53	32.92	29.53	30.99
Mass Emissions on Production Basis	lbm/Ton		0.211	0.222	0.236	0.214	0.224
Sulfur Dioxide	SO2	Span	30	30	30	30	
Indicated average-Dry	ppmv	Cid	8.11	7.11	8.80	8.71	8.21
Cylinder Value - High Range calibration gas	ppmv	Sc	15.27	15.27	15.27	15.27	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initia	ppmv	Sbs	14.73	14.73	14.73	14.73	
System Calibration Response - Low Range gas - Initial	ppmv	Zbs	0.35	0.35	0.35	0.35	
System Calibration Response - Low Range gas - Final	ppmv	Zbe	5.99	5.99	5.99	5.99	
System Calibration Response - High Range gas - Final	ppmv	Sbe	19.22	19.22	19.22	19.22	
Actual average - Dry (Corrected for Drift)	ppmv-SO2	Cgas	4.67	4.93	5.46	3.85	4.75
Mass Emissions	lbm-SO2 / hr	Mgas	18.11	19.11	21.19	14.92	18.41
Mass Emissions on Production Basis	lbm/Ton		0.131	0.139	0.152	0.108	0.133

TGOC Emissions

Client	Oregon Steel Mills	MJE/TJH/CDB		Testers
Source	ICA Baghouse-EAF Inlet	1685		File
Location	Portland, OR	MEW		Analysis/QA
Date	07-Nov-2001			

Number of Completed Runs Date Tested			Combined	Run 1	Run 2	Run 3	Average
System Calibration Time - Initial		Tci	08:35	08:35	08:35	08:35	
Test Time-Starting		Tts	10:31	10:31	12:09	13:50	
Test Time-Ending		Tte	15:14	12:05	13:33	15:17	
System Calibration Time - Final		Tcf	15:20	15:20	15:20	15:20	
Test Mid-point Time		Tx	12:52	11:18	12:51	14:33	
Volumetric Flowrate, Dry Standard	dscf/min	Qsd	388,771	388,771	388,771	388,771	
Production	Tons/hr		138.2	137.4	139.4	137.8	138.2
Oxygen	%	O2	20.51	20.51	20.45	20.49	
Carbon Dioxide	%	CO2	0.55	0.53	0.62	0.61	
Moisture, Mole Fraction dry Gas		mfg	96.60%	96.60%	96.60%	96.60%	
Total Gaseous Organic Concentration	**(TGOC-1)**	Span	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00	1.00	1.00	1.00	
Span Gas- Carbon Count Equivalent		K	3				
Cylinder Value - High Range calibration gas	ppmv-C3		27.79	27.79	27.79	27.79	
Cylinder Value - Low Range (Zero) calibration gas	ppmv-C3	Coa	0.00	0.00	0.00	0.00	
Indicated average- Wet	ppmv-C3	Ciw	9.84	11.32	9.11	9.73	10.05
Span Gas Concentration- Equivalent	ppmv-C3	Sc	28.69	28.69	28.69	28.69	
Zero Gas Concentration- Equivalent	ppmv-C3	Zc	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initial	ppmv-C3	Ss	28.82	28.82	28.82	28.82	
System Calibration Response - Low Range gas - Initial	ppmv-C3	Zs	0.59	0.59	0.59	0.59	
System Calibration Response - Low Range gas - Final	ppmv-C3	Ze	2.27	2.27	2.27	2.27	
System Calibration Response - High Range gas - Final	ppmv-C3	Se	34.57	34.57	34.57	34.57	
Actual average - Wet (Corrected for Drift & Response)	ppmv-C3		7.62	9.66	6.95	6.90	7.83
Actual average - Dry (Corrected for Drift & Response)	ppmv-C3		7.88	10.00	7.19	7.14	8.11
Actual average - Dry	ppmv-C	Cgas	22.91	29.05	20.90	20.75	23.56
Mass Emissions	lbm-C / hr		16.66	21.12	15.19	15.09	17.13
Mass Emissions on Production Basis	lbm-C/Ton		0.121	0.154	0.109	0.109	0.124
TGNMOC (TGOC less Methane)	**(TGOC-2)**	Span	100	100	100	100	
Span Gas- Instrument Response Factor	JUM Factor	C3H8	1.00	1.00	1.00	1.00	
Span Gas- Carbon Count Equivalent		K	3				
Cylinder Value - High Range calibration gas	ppmv-C3		27.79	27.79	27.79	27.79	
Cylinder Value - Low Range (Zero) calibration gas	ppmv-C3	Coa	0.00	0.00	0.00	0.00	
Indicated average- Wet	ppmv-C3	Ciw	5.02	4.26	4.65	6.47	5.13
Span Gas Concentration- Equivalent	ppmv-C3	Sc	28.69	28.69	28.69	28.69	
Zero Gas Concentration- Equivalent	ppmv-C3	Zc	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initial	ppmv-C3	Ss	27.32	27.32	27.32	27.32	
System Calibration Response - Low Range gas - Initial	ppmv-C3	Zs	0.42	0.42	0.42	0.42	
System Calibration Response - Low Range gas - Final	ppmv-C3	Ze	2.68	2.68	2.68	2.68	
System Calibration Response - High Range gas - Final	ppmv-C3	Se	30.81	30.81	30.81	30.81	
Actual average - Wet (Corrected for Drift & Response)	ppmv-C3		3.28	3.07	2.90	4.15	3.37
Actual average - Dry (Corrected for Drift & Response)	ppmv-C3		3.39	3.18	3.01	4.30	3.49
Actual average - Dry	ppmv-C	Cgas	9.86	9.23	8.74	12.49	10.15
Mass Emissions	lbm-C / hr		7.17	6.71	6.35	9.08	7.38
Mass Emissions on Production Basis	lbm-C/Ton		0.052	0.049	0.046	0.066	0.053
METHANE							
Actual average - Wet (Corrected for Drift & Response)	ppmv-C3		4.34	6.59	4.04	2.75	4.46
Actual average - Dry (Corrected for Drift & Response)	ppmv-C3		4.49	6.82	4.18	2.84	4.62
Actual average - Dry	ppmv-C		13.05	19.82	12.16	8.26	13.41
Mass Emissions	lbm-C / hr		9.49	14.41	8.84	6.01	9.75
Mass Emissions on Production Basis	lbm-C/Ton		0.069	0.105	0.063	0.044	0.071

Molecular Emissions

Client	Oregon Steel Mills			MJE/TJH/CDB			Testers
Source	ICA Baghouse-EAF Inle			1685			File
Location	Portland, OR			MEW			Analysis/QA
Date	07-Nov-2001						
			Combined	Run 1	Run 2	Run 3	Avg
System Calibration Time - Initial		Tci	08:35	08:35	08:35	08:35	
Test Time-Starting (Hivol Interval)		Tts	10:31	10:31	12:09	13:50	
Test Time-Ending (Hivol Interval)		Tte	15:14	12:05	13:33	15:17	
System Calibration Time - Final		Tcf	15:20	15:20	15:20	15:20	
Test Mid-point Time		Tx	12:52	11:18	12:51	14:33	
Volumetric Flowrate, Dry Standard - Inlet Average	dscf/min	Qsd	388,771	388,771	388,771	388,771	
Production Rate	Ton/hr		138.20	137.36	139.40	137.82	
Molecular weight, Dry Stack	lbm/lb-mole	Md	29.03	29.03	29.04	29.04	
Oxygen-Inlet	O2	Span	25	25	25	25	
Indicated average - Dry	%	Cid	20.17	20.26	20.11	20.04	20.14
Cylinder Value - High Range calibration gas	%	Cma	11.60	11.60	11.60	11.60	
Cylinder Value - Low Range (Zero) calibration gas	%	Coa	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initia	%	Cmi	11.57	11.57	11.57	11.57	
System Calibration Response - Low Range gas - Initia	%	Coi	0.03	0.03	0.03	0.03	
System Calibration Response - Low Range gas - Final	%	Cof	0.05	0.05	0.05	0.05	
System Calibration Response - High Range gas - Final	%	Cmf	11.34	11.34	11.34	11.34	
Actual average - Dry (Corrected for Drift)	%	Cgas	20.51	20.51	20.45	20.49	20.48
Carbon Dioxide-Inlet	CO2	Span	25	25	25	25	
Indicated average - Dry	%	Cid	0.57	0.58	0.64	0.60	0.61
Cylinder Value - High Range calibration gas	%	Cma	12.41	12.41	12.41	12.41	
Cylinder Value - Low Range (Zero) calibration gas	%	Coa	0.00	0.00	0.00	0.00	
System Calibration Response - High Range gas - Initia	%	Cmi	12.37	12.37	12.37	12.37	
System Calibration Response - Low Range gas - Initia	%	Coi	0.10	0.10	0.10	0.10	
System Calibration Response - Low Range gas - Final	%	Cof	-0.02	-0.02	-0.02	-0.02	
System Calibration Response - High Range gas - Final	%	Cmf	12.35	12.35	12.35	12.35	
Actual average - Dry (Corrected for Drift)	%	Cgas	0.550	0.533	0.620	0.609	0.587

Calibration Field Record

Client _____ Tester _____

Date _____ Observer _____

Source _____ Data Logger ID _____

Leak Checks Pre-OK / Post-OK Response Time	Valve Position	Cylinder #	Span Gas	Cylinder Value (CV)	Analyzer Calibration Response (ACR)	Start Run 1 _ System Calibration Response (SCRs)	End Run 1 _ Start Run 2 _ System Calibration Response (SCRs)	End Run 2 _ Start Run 3 _ System Calibration Response (SCRs)	End Run 3 _ System Calibration Response (SCRs)
Times									
CO2 % ch___			CO2			21.79			
Range		27	CO2	12.41		12.37	12.35		
Analyzer Model		0-9	N2		0.00	0.10	0.02		
Analyzer SN:									
CO ppm ch___			CO	380	471.5	457.4	883.3		
Range		27/R12	CO		496/35.3	478.1/47	476/187		
Analyzer Model			N2			0.75	-0.13		
Analyzer SN:									
O2% ch___			O2	Amb	20.95	20.8%			
Range			O2	11.60	11.52	11.57	11.34		
Analyzer Model		27	N2	0.00	0.00	0.03	0.05		
Analyzer SN:									
NOx ppm ch___			NOx	183.2	184.5	181.7	179.2		
Range		27/N7	NOx		5.72/24.07	78.29/24.21	36.46/252		
Analyzer Model		0-9	N2		0.5	0.48	0.17		
Analyzer SN:									
TGOC ppm ch___				39.0		87.5			
Range						51.5			
Analyzer Model						25.52/402			
Analyzer SN:			Air	CO	0.36	2.59	2.27		
ch___									
Range									
Analyzer Model									
Analyzer SN:						0.42			

Check	Performance Specs			
Analyzer Calibration Error	| ACR-CV | / SPAN	2 (25A @ 5%)	Hot Line Temp	250
Sampling System Bias	(SRCs-ACR) /SPAN	5	Hot Line Temp	
Zero and Cal Drift	(SRC2-SRC1) /SPAN	3		

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

Calibration Field Record

Client _____ Tester _____

Date _____ Observer _____

Source _____ Data Logger ID _____

Leak Checks Pre-CK Post-CK Response Time	Valve Position	Cylinder #	Span Gas	Cylinder Value (CV)	Analyzer Calibration Response (ACR)	Start Run __ System Calibration Response (SCR1)	End Run __ Start Run __ System Calibration Response (SCR1)	End Run __ Start Run __ System Calibration Response (SCR1)	End Run __ System Calibration Response (SCR1)	
Times										
CO2 % ch___			CO2							
Range			CO2							
Analyzer Model			N2							
Analyzer SN:										
CO ppm ch___			CO							
Range			CO							
Analyzer Model			N2							
Analyzer SN:										
O2% ch___			O2							
Range			O2							
Analyzer Model			N2							
Analyzer SN:										
NOx ppm ch___			NOx							
Range			NOx							
Analyzer Model			N2							
Analyzer SN:										
TGOC ppm ch___										
Range										
Analyzer Model										
Analyzer SN:			Air							
SC2 ch___										
Range 0-30 ppm										
Analyzer Model Rosa										
Analyzer SN:										

Check	Performance Specs		
Analyzer Calibration Error	| ACR-CV | / SPAN	2 (25A @ 5%)	Hot Line Temp 250
Sampling System Bias	(SRCx-ACR) /SPAN	5	Hot Line Temp
Zero and Cal Drift	(SRC2-SRC1) /SPAN	3	

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

HORIZON
12965 NE Whitaker Way • Portland, OR 97230
Phone (503) 256-6060 • Fax (503) 256-0808
www.horizonengineering.com

OSM Manual gas Values

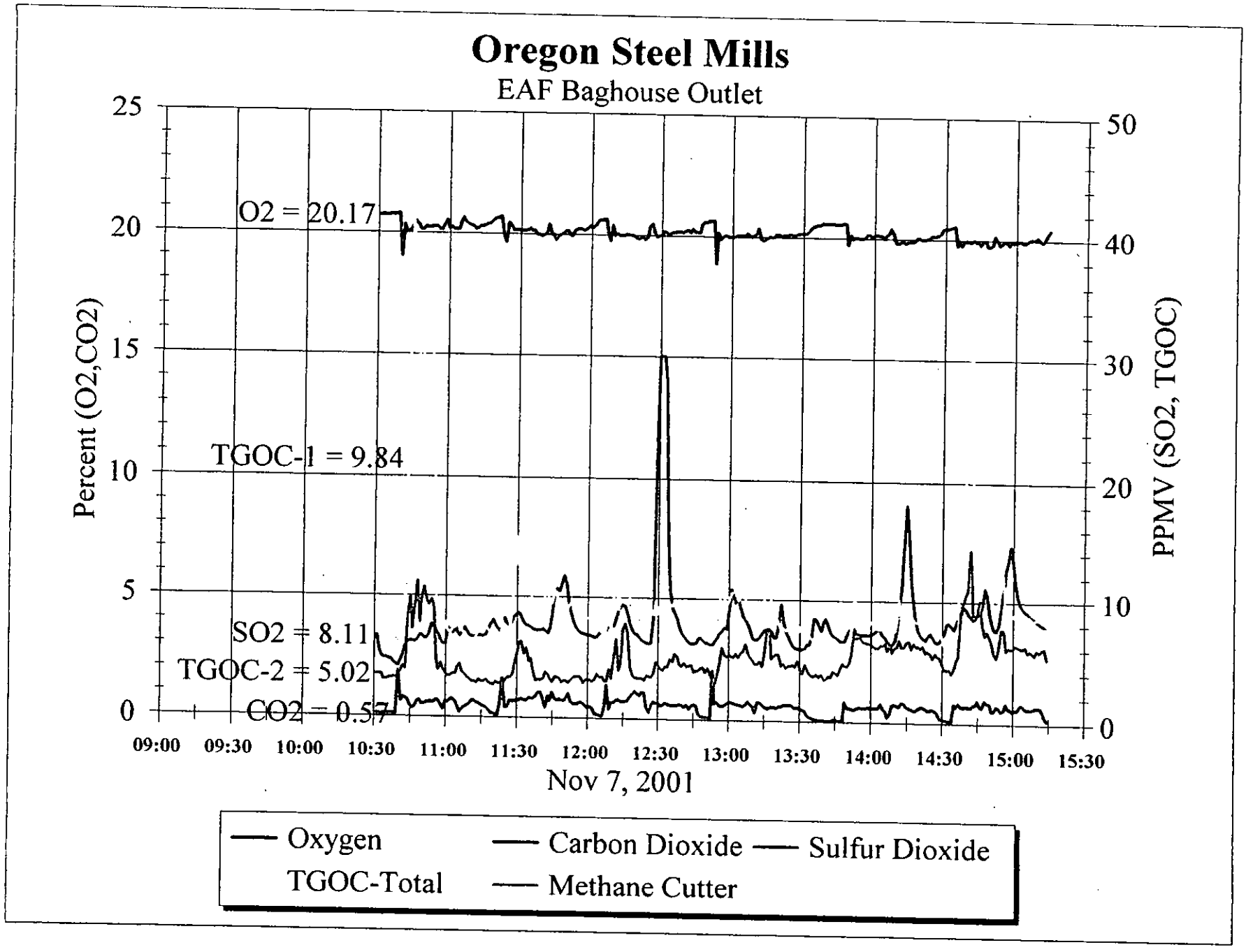
DATE 11/7/01

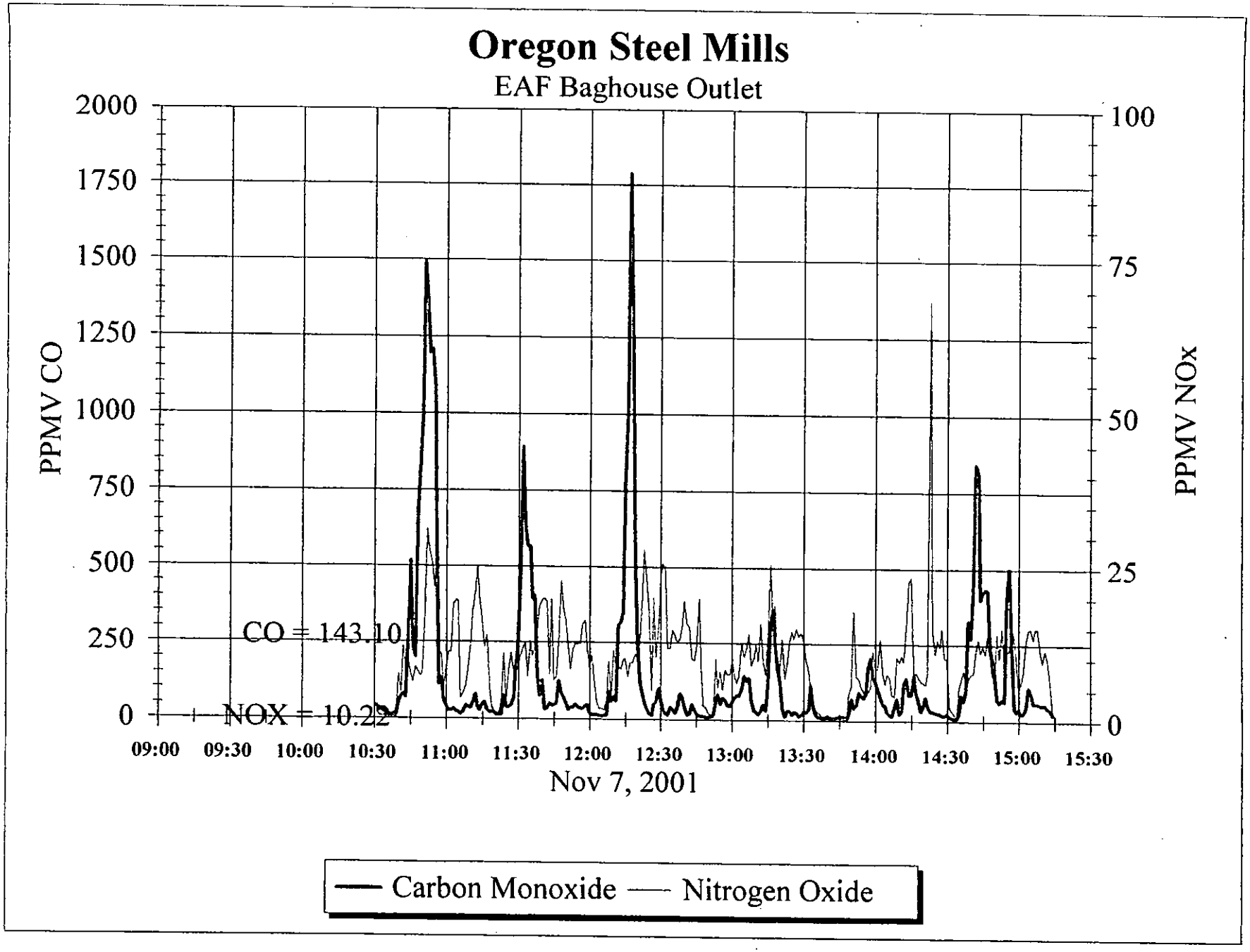
	13:59:00	13:59:15	13:59:30	13:59:45
O_2 %	20.18	20.05	20.03	20.11
CO_2 %	0.54	0.66	0.67	0.59
CO ppm	161	169	142	178
NO_x ppm	5.8	7.4	16.72	15.5
SO_2 ppm	7.08	7.1	7.17	7.1
C_3H_8 VOC, ppm	6.98	6.6	6.1	6.99
C_3H_8 VOC, ppm	8.72	8.4	6.47	8.7

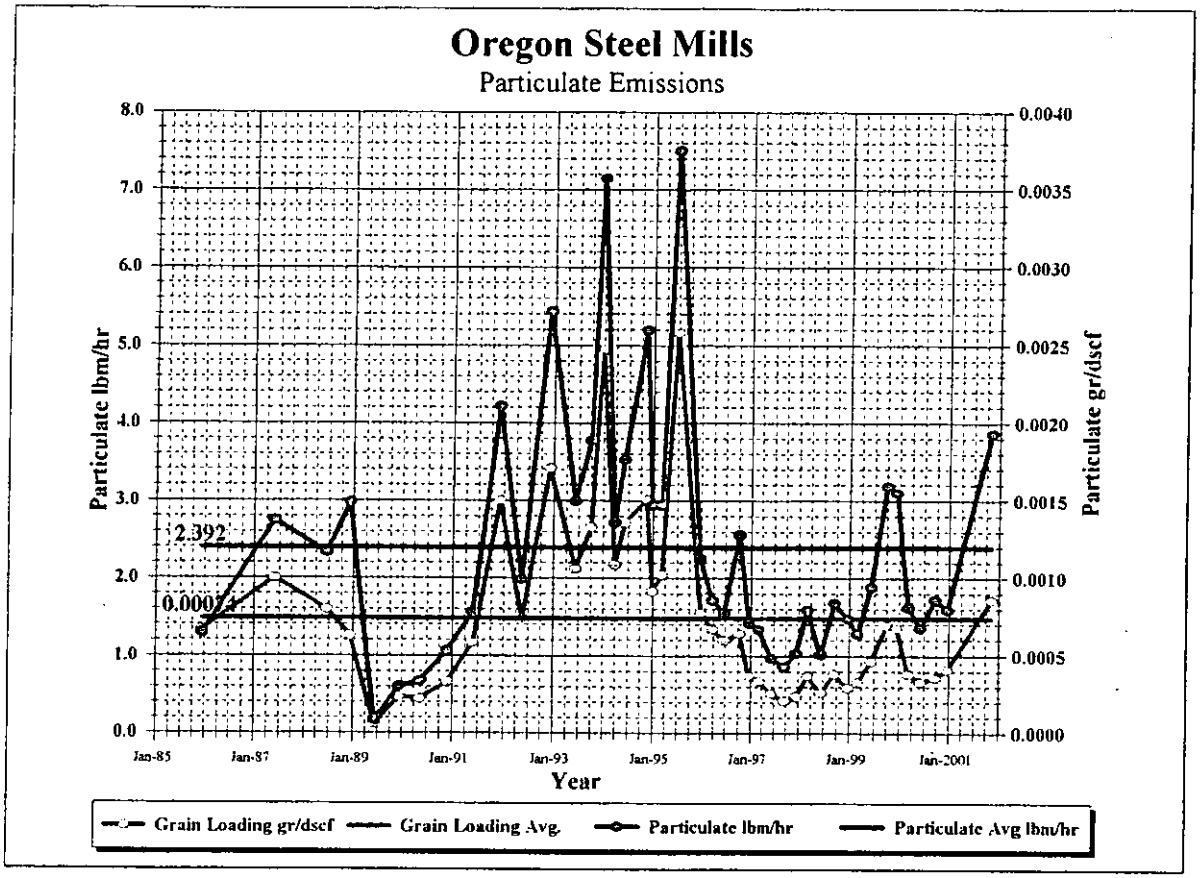
Bias Check

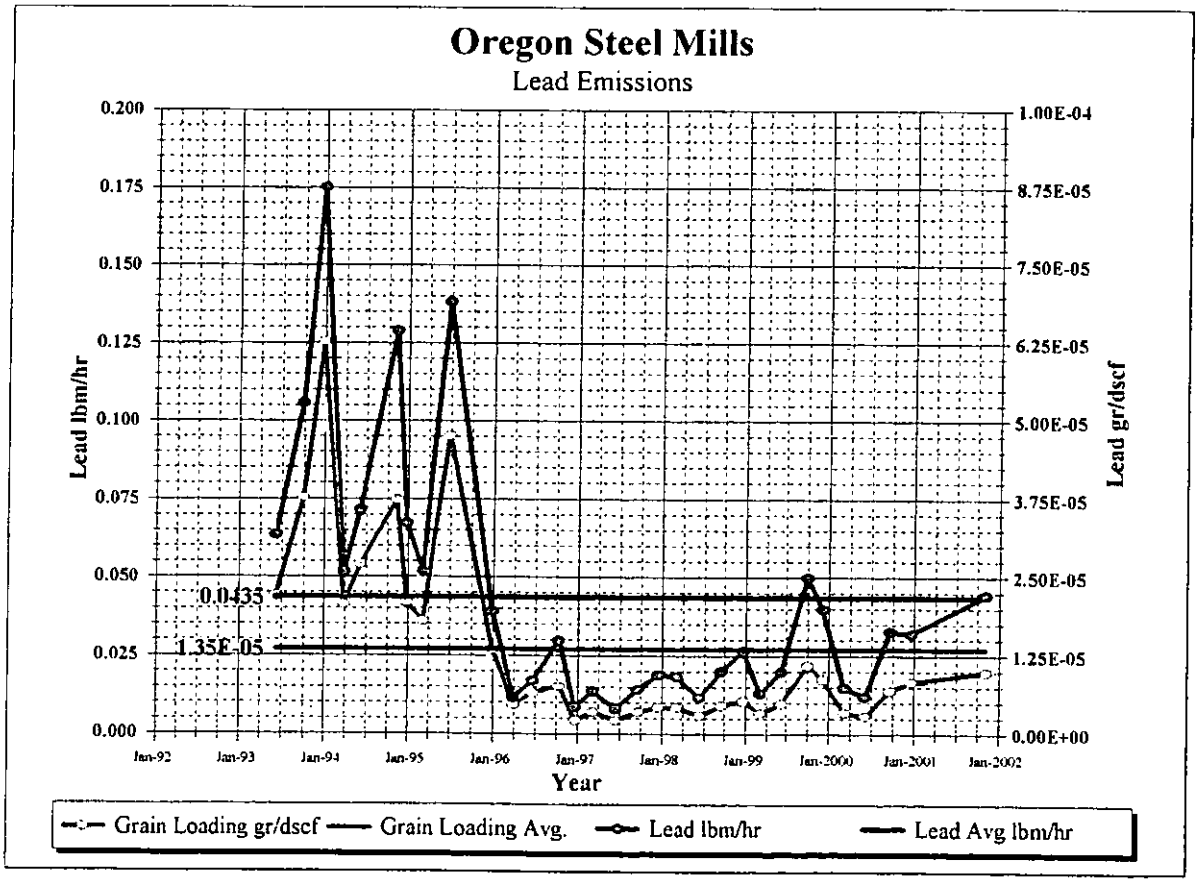
Oregon Steel Mills EAF Baghouse 7-November-2001			Span	Cylinder Value CV	Analyzer Calibration Response ACR	Initial System Calibration Response SCRi	Final System Calibration Response SCRf	Cylinder Value Percent of Span	Difference < 2%	Initial System Calibration Bias < 5%	Final System Calibration Bias < 5%	Drift < 3%
OXYGEN												
Run 1-3	High Range		25	20.95	20.95	20.88		84%	0%			
	Mid-Range		25	11.60	11.62	11.57	11.34	46%	0%	0%	1%	1%
	Zero		25	0.00	0.00	0.03	0.05	0%	0%	0%	0%	0%
CARBON DIOXIDE												
Run 1-3	High Range		25	21.83	21.85	21.78	21.46	87%	0%			
	Mid-Range		25	12.41	12.55	12.37	12.35	50%	1%	1%	1%	0%
	Zero		25	0.00	0.00	0.10	-0.02	0%	0%	0%	0%	0%
CARBON MONOXIDE												
Run 1-3	High Range		2000	880.00	871.50	857.40	883.30	44%	0%	1%	1%	1%
	Mid-Range		2000	499.00	496.00	478.10	498.00	25%	0%	1%	0%	1%
	Mid-Range		2000	85.90	85.22	84.70	87.20	4%	0%	0%	0%	0%
	Zero		2000	0.00	-0.45	-0.75	-0.93	0%	0%	0%	0%	0%
NITROGEN OXIDES												
Run 1	High Range		200	183.20	184.50	181.70	179.20	92%	1%	1%	3%	1%
	Mid-Range		200	89.80	88.72	88.29	86.46	45%	1%	0%	1%	1%
	Mid-Range		200	25.25	24.37	24.21	23.52	13%	0%	0%	0%	0%
	Zero		200	0.00	0.00	0.48	-0.17	0%	0%	0%	0%	0%
SULFUR DIOXIDE												
Run 1	High Range		30	26.47	26.43			88%	0%			0%
	Mid-Range		30	15.27	15.51	14.73	19.22	51%	1%	3%	12%	15%
	Zero		30	0.00	0.08	0.35	5.99	0%	0%	1%	20%	19%
TOTAL GASEOUS ORGANIC CONCENTRATION #1												
Run 1	High Range	C3H8	100	88.85	87.55			89%				
	Mid-#1	CH4	100	52.32	51.53	62.18		52%				11%
	Mid-#2	CH4	100	29.89	28.82	34.57		30%				6%
	Mid-#3	CH4	100	9.49	9.02	12.51		9%				3%
	Zero	N2	100	0.36	0.59	2.27		0%				2%
TOTAL GASEOUS ORGANIC CONCENTRATION #2												
Run 1	High Range	C3H8	100	89.01	87.51			89%				
	Mid-#1	CH4	100	51.90	49.65	51.96		52%				2%
	Mid-#2	CH4	100	28.82	27.32	30.81		29%				3%
	Mid-#3	CH4	100	8.71	8.32	11.26		9%				3%
	Zero	N2	100	-0.07	0.42	2.68		-0%				2%

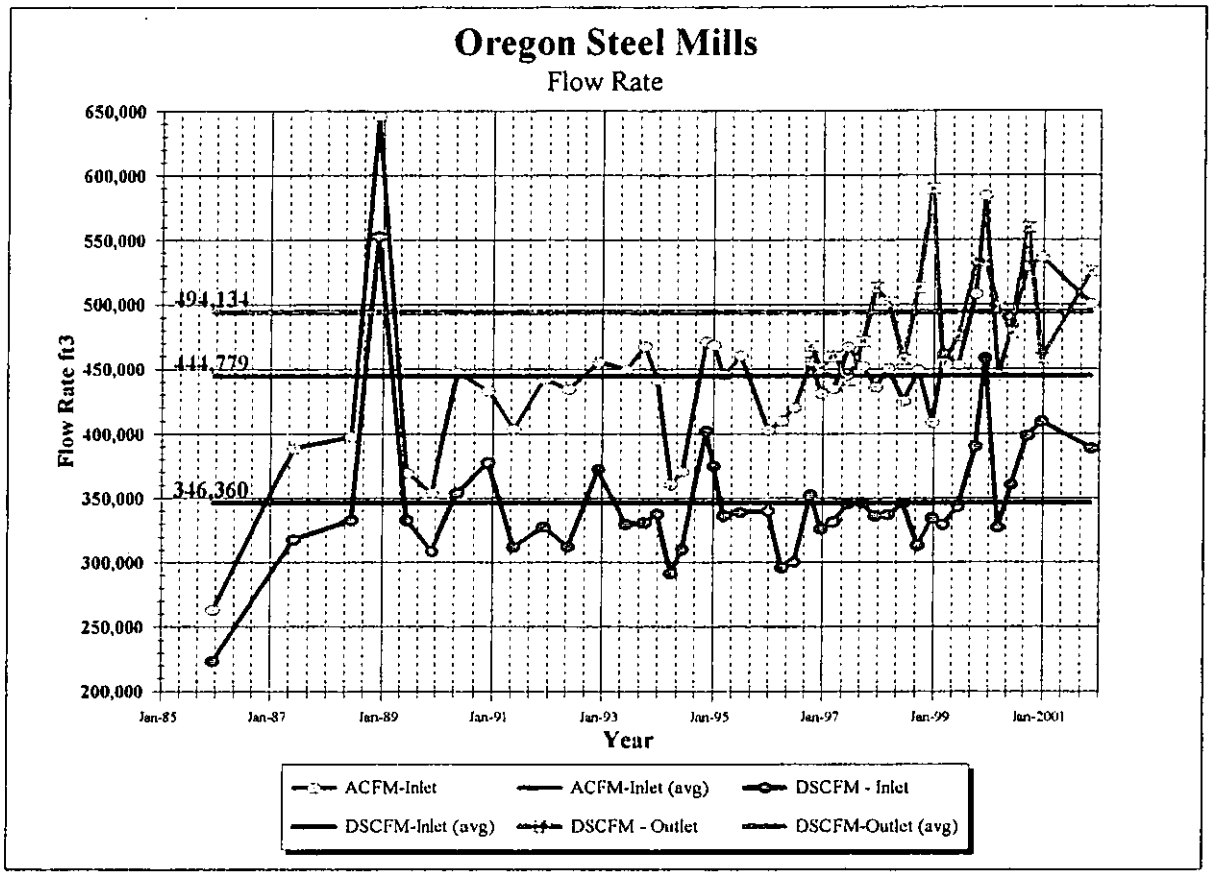
Part 60, Appendix A, Method 6C, Figures 6C-3 to 6C-5

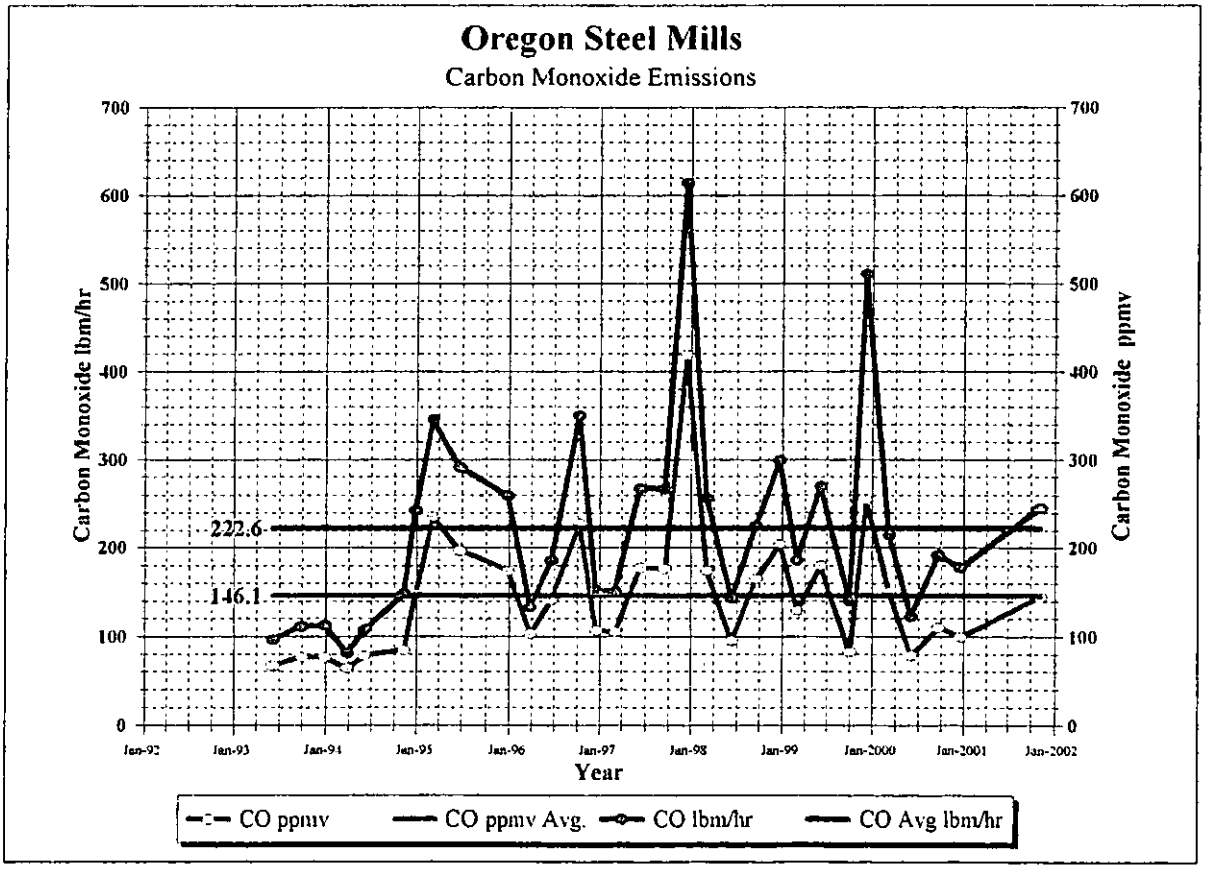

Oregon Steel Mills
EAF Baghouse Outlet
Percent (O2,CO2)
PPMV (SO2, TGOC)
O2 = 20.17
TGOC-1 = 9.84
SO2 = 8.11
TGOC-2 = 5.02
CO2 = 0.57
25
20
15
10
5
0
50
40
30
20
10
0
09:00
09:30
10:00
10:30
11:00
11:30
12:00
12:30
13:00
13:30
14:00
14:30
15:00
15:30
Nov 7, 2001
Oxygen
Carbon Dioxide
Sulfur Dioxide
TGOC-Total
Methane Cutter

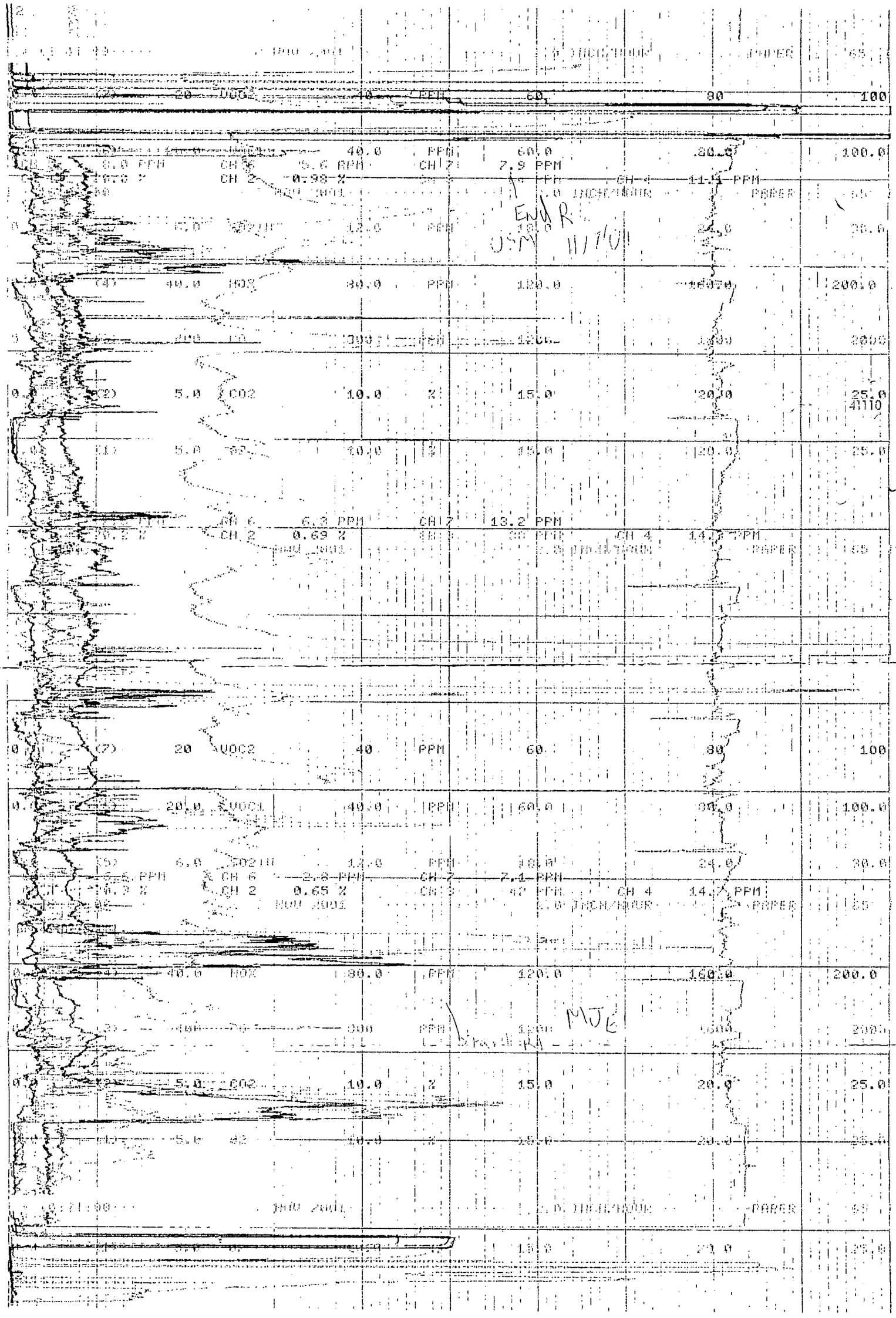

Oregon Steel Mills
EAF Baghouse Outlet
2000
1750
1500
1250
1000
750
500
250
0
PPMV CO
100
75
50
25
0
PPMV NOx
CO = 143.10
NOX = 10.22
09:00
09:30
10:00
10:30
11:00
11:30
12:00
12:30
13:00
13:30
14:00
14:30
15:00
15:30
Nov 7, 2001
Carbon Monoxide
Nitrogen Oxide


Oregon Steel Mills
Particulate Emissions
Particulate lbm/hr
Particulate gr/dscf
2.392
0.0002
Year
Grain Loading gr/dscf
Grain Loading Avg.
Particulate lbm/hr
Particulate Avg lbm/hr


Oregon Steel Mills
Lead Emissions
Lead lbm/hr
Lead gr/dscf
0.0435
1.35E-05
Year
Grain Loading gr/dscf
Grain Loading Avg.
Lead lbm/hr
Lead Avg lbm/hr


Oregon Steel Mills
Flow Rate
650,000
600,000
550,000
500,000
450,000
400,000
350,000
300,000
250,000
200,000
Flow Rate ft3
494,134
444,779
346,360
Jan-85
Jan-87
Jan-89
Jan-91
Jan-93
Jan-95
Jan-97
Jan-99
Jan-2001
Year
ACFM-Inlet
ACFM-Inlet (avg)
DSCFM - Inlet
DSCFM-Inlet (avg)
DSCFM - Outlet
DSCFM-Outlet (avg)


Oregon Steel Mills
Carbon Monoxide Emissions
700
600
500
400
300
200
100
0
Carbon Monoxide lbm/hr
Carbon Monoxide ppmv
222.6
146.1
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-2000
Jan-2001
Jan-2002
Year
CO ppmv
CO ppmv Avg.
CO lbm/hr
CO Avg lbm/hr


PPM
INCH/HOUR
PAPER
20
40
60
80
100
CH 6 6.3 PPM
CH 2 0.69 %
CH 7 13.2 PPM
CH 4 14.7 PPM
CH 6 2.8 PPM
CH 2 0.65 %
CH 7 7.1 PPM
CH 4 14.7 PPM
END R
USM 11/1/01
MJE

Production/Process Data

Furnace Heat Logs

MSDS Sheet

Baghouse Pressure Drop Field Data

OSM #3 Furnace Heat Log Data Reduction
07-Nov-2001

	Heat	Last Tap	Start Charge	Finish Tap	C-T mins	T-T mins	First Charge lbms	Second Charge lbms	Total Charge lbms	Run Total lbms	Total Time mins	Down Time mins	Run Time mins	Tons/hr
	114,406													
	114,407	08:21	09:51	10:36	45.0	135.0	137,900	25,300	163,200					
Run 1	114,408	10:36	10:41	11:21	40.0	45.0	139,400	61,000	200,400	384,600	84		84	137.36
	114,409	11:21	11:26	12:05	39.0	44.0	139,200	45,000	184,200					
Run 2	114,410	12:05	*12:10*	12:49	39.0	44.0	139,500	60,400	199,900	399,600	86		86	139.40
	114,411	12:49	12:54	13:36	42.0	47.0	138,800	60,900	199,700					
Run 3	114,412	13:36	13:50	14:32	42.0	56.0	139,800	60,000	199,800	390,500	85		85	137.82
	114,413	14:32	14:36	15:15	39.0	43.0	140,800	49,900	190,700					
Average					40.2	46.5	139,583	56,200	195,783					
Total										1,174,700	255		255	138.20

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114407 Grade: X-60-1 Grade No: 7168

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 951
Tap Time: 1036

Heats on Delta: 402 Last Heat Tapped: 821

Total Charge Wt	: 215.0	Furnace Lime Lbs	: 5
Hot Metal Wt	: 45.0	Oxygen Batch	: 0
Pour Back	: 24.0	Nat. Gas Batch	: 127
		Tap Temp	: 0
Melt Efficiency Rating	: 0.00	Total MWH	: 34.3
Charge to Tap Time	: 45	Avg. MW	: 60.6
Tap to Tap Time	: 135	KWH/Ton	: 403.5
Total Delay Time	: 101.2	Avg. Pwr. Factor	: 0.83

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st - 137,900
2nd - 25,300

Oregon Steel Mills, Portland Oregon

* * * * * * H E A T L O G * * * * * *

Heat No. 114407 BOH 11/07 at 08:21 Product Code 7168

Melter 1 1st Helper 1 Ladle Temp 0 187 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
08:25	3.95	0.00	3.95	0	0.00			0.00	0.00	Lime_#_
09:50	89.27	0.00	85.32	0	0.00			0.00	0.00	
09:51	89.47	0.00	0.20	0	0.00			0.00	0.00	CHG_1__140.
09:52	90.86	1.38	0.00	2	56.37	0.774	1 S M	1.30	72.12	Bore_In_____
09:54	92.76	1.90	0.00	4	56.26	0.827	1 L M	3.08	64.10	Bore_In_____
09:57	95.95	3.20	0.00	7	55.71	0.820	1 L M	6.05	63.98	Melt_____
10:02	100.97	5.01	0.00	11	59.02	0.837	1 L M	10.98	63.23	Refine_____
10:05	103.64	2.67	0.00	14	59.75	0.851	1 L M	13.64	61.60	
10:07	105.60	0.00	1.97	13	0.00			13.64	0.00	CHG_2__ 30.
10:07	105.85	0.00	0.25	13	0.00			13.64	0.00	
10:08	107.34	1.48	0.00	15	61.83	0.798	1 S M	15.17	73.51	
10:13	112.35	5.02	0.00	18	59.74	0.845	1 L M	20.16	62.01	
10:16	115.40	3.05	0.00	21	61.50	0.863	1 L M	23.29	60.57	
10:19	118:18	2.78	0.00	22	64.83	0.816	1 S M	26.29	71.29	
10:19	118.27	0.08	0.00	22	38.45	0.846	1 L M	26.35	48.72	
10:22	121.07	0.00	2.80	22	0.00			26.35	0.00	P'back_ 21.
10:27	126.03	4.97	0.00	25	64.83	0.815	1 S M	31.71	71.59	P'back_ 24.
10:29	128.45	2.42	0.00	26	64.85	0.807	1 S M	34.33	71.64	
10:29	128.47	0.02	0.00	26	6.48	0.707	1 L M	34.33	11.88	
10:36	135.15	0.00	6.68	25	0.00			34.33	0.00	Tap_T_____

total lime weight 4.7
total coke weight 0.0
total oxygen 0
total gas 127

cold charge weight 170.0
hot charge weight 45.0
total charge weight 215.0

** HEAT ELECTRICAL SUMMARY **

Heat No.: 114407 Time: 10:36

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	Floor
UNDEF	1 S	11.6	34.3	21.59	64.45	46.42	79.43	0.811	11.3	11.6	11.6	72.5
UNDEF	1 L	8.2	24.0	22.35	60.07	36.94	70.52	0.852	8.2	8.2	8.2	62.0
BOREIN	1 S	1.4	4.1	21.75	56.37	46.09	72.82	0.774	1.3	1.4	1.4	71.5
BOREIN	1 L	1.9	5.6	22.33	56.26	38.29	68.05	0.827	1.9	1.9	1.9	65.1
MELT	1 L	3.2	9.4	22.28	55.71	38.83	67.91	0.820	3.2	3.2	3.2	64.0
REFINE	1 L	7.7	22.6	22.27	59.27	38.03	70.43	0.842	7.7	7.7	7.7	63.3
		34.0		22.04	60.62	41.06	73.22	0.828	33.6	34.0	34.0	66.4

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114407 Date: 11-07-01 Shift: 2
Melter: 1 First Helper: 1 Product Code: 7168
Tap Time: 10:36 Prev Heat Tapped: 08:21 Time Tap to Tap: 2 hr. 15 m

CHARGE	TIME	WEIGHT
1	09:51	140.0
2	10:07	30.0
3	none	none
4	none	none
******		******
TOTAL(klbs)		215.0
TOTAL(tons)		107.5

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	34.33
KWH/TON:	319.3

* HEATS ON LIN
* DELTA LIFE
* CHG WT(klbs

Chemistry File Heat Number 114407 has incorrect number of characters

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114408 Grade: X-60-1 Grade No: 7168

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 1041
Tap Time: 1121

Heats on Delta: 403 Last Heat Tapped: 1036

Total Charge Wt	: 280.0	Furnace Lime Lbs	: 5
Hot Metal Wt	: 0.0	Oxygen Batch	: 0
Pour Back	: 0.0	Nat. Gas Batch	: 122
		Tap Temp	: 0
Melt Efficiency Rating	: 0.00	Total MWH	: 29.2
Charge to Tap Time	: 40	Avg. MW	: 60.6
Tap to Tap Time	: 45	KWH/Ton	: 208.6
Total Delay Time	: 16.1	Avg. Pwr. Factor	: 0.83

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st = 139,400
2nd = 61,000

Oregon Steel Mills, Portland Oregon

* * * * * * HEAT LOG * * * * * *

Heat No. 114408 BOH 11/07 at 10:36 Product Code 7168

Melter 1 1st Helper 1 Ladle Temp 0 188 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
10:41	5.12	0.00	5.12	0	0.00			0.00	0.00	Inspect_Fce_
10:41	5.15	0.00	0.03	0	0.00			0.00	0.00	CHG_1__140.0
10:41	5.30	0.00	0.15	0	0.00			0.00	0.00	
10:43	7.28	1.98	0.00	27	61.28	0.790	1 S M	2.03	73.87	Bore_In
10:44	8.28	1.00	0.00	36	55.83	0.833	1 L M	2.95	62.71	Bore_In
10:45	8.97	0.00	0.68	33	0.00			2.95	0.00	Slip_A
10:45	9.03	0.00	0.07	33	0.00			2.95	0.00	Slip_B
10:47	10.80	0.00	1.77	28	0.00			2.95	0.00	Slip_C
10:47	10.95	0.15	0.00	29	32.92	0.723	1 L M	3.04	54.39	Bore_In
10:50	14.05	3.10	0.00	44	57.87	0.831	1 L M	6.03	64.00	Melt
10:54	17.98	3.93	0.00	57	58.50	0.840	1 L M	9.86	61.87	Lime_#_ 5
10:57	21.71	3.73	0.00	64	58.28	0.848	1 L M	13.49	60.49	
10:59	23.58	0.00	1.87	59	0.00			13.49	0.00	CHG_2__140.0
11:00	24.45	0.87	0.00	60	61.73	0.797	1 S M	14.38	72.22	
11:04	28.69	4.25	0.00	66	59.19	0.843	1 L M	18.57	60.88	
11:07	30.91	0.00	2.22	62	0.00			18.57	0.00	
11:12	35.88	4.97	0.00	67	64.20	0.814	1 S M	23.88	70.53	
11:17	40.81	4.93	0.00	71	64.92	0.810	1 S M	29.22	70.88	
11:17	40.84	0.03	0.00	71	39.96	0.849	1 L M	29.24	45.37	
11:21	45.03	0.00	4.18	64	0.00			29.24	0.00	Tap_T

total lime weight 4.7
total coke weight 0.0
total oxygen 0
total gas 122

cold charge weight 280.0
hot charge weight 0.0
total charge weight 280.0

** HEAT ELECTRICAL SUMMARY **

Heat No.: 114408 Time: 11:21

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	----- Floor
UNDEF	1 S	10.8	37.2	21.65	64.33	46.42	79.33	0.811	10.7	10.8	10.8	70.8
UNDEF	1 L	4.3	14.8	22.32	59.04	37.68	70.04	0.843	4.3	4.3	4.3	61.9
BOREIN	1 S	2.0	6.8	21.78	61.28	47.50	77.53	0.790	1.9	2.0	2.0	74.3
BOREIN	1 L	1.1	4.0	22.46	52.84	36.30	64.11	0.824	1.1	1.1	1.1	60.6
MELT	1 L	3.1	10.7	22.36	57.87	38.81	69.68	0.831	3.1	3.1	3.1	63.8
REFINE	1 L	7.7	26.5	22.18	58.40	37.08	69.18	0.844	7.7	7.7	7.7	62.7
		28.9		22.01	60.62	41.51	73.47	0.825	28.8	28.9	28.9	66.4

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114408 Date: 11-07-01 Shift: 2
Melter: 1 First Helper: 1 Product Code: 7168
Tap Time: 11:21 Prev Heat Tapped: 10:36 Time Tap to Tap: 0 hr. 45 mi

CHARGE	TIME	WEIGHT
1	10:41	140.0
2	10:59	140.0
3	none	none
4	none	none
******		******
TOTAL(klbs)		280.0
TOTAL(tons)		140.0

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	29.24
KWH/TON:	208.9

* HEATS ON LIN
* DELTA LIFE:
* CHG WT(klbs):

Chemistry File Heat Number 114408 has incorrect number of characters

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114409 Grade: X-60-1 Grade No: 7168

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 1126
Tap Time: 1205

Heats on Delta: 404 Last Heat Tapped: 1121

Total Charge Wt	: 199.2	Furnace Lime Lbs	: 0
Hot Metal Wt	: 0.0	Oxygen Batch	: 0
Pour Back	: 0.0	Nat. Gas Batch	: 133
		Tap Temp	: 0
Melt Efficiency Rating	: 0.00	Total MWH	: 33.8
Charge to Tap Time	: 39	Avg. MW	: 60.1
Tap to Tap Time	: 44	KWH/Ton	: 339.4
Total Delay Time	: 10.6	Avg. Pwr. Factor	: 0.83

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st = 139,200
2nd = 45,000

Oregon Steel Mills, Portland Oregon
* * * * * * HEAT LOG * * * * * *

Heat No. 114409 BOH 11/07 at 11:21 Product Code 7168
Melter 1 1st Helper 1 Ladle Temp 0 189 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
11:25	4.75	0.00	4.75	0	0.00			0.00	0.00	Inspect_Fce_
11:26	4.83	0.00	0.08	0	0.00			0.00	0.00	CHG_1__139.3
11:27	5.98	1.15	0.00	19	60.76	0.786	1 S M	1.16	72.99	Bore_In_____
11:27	6.08	0.10	0.00	21	60.84	0.786	1 L M	1.27	72.56	_____
11:29	7.98	1.90	0.00	39	55.52	0.830	1 L M	3.02	61.96	Bore_In_____
11:32	11.08	3.10	0.00	56	58.60	0.842	1 L M	6.05	62.06	Melt_____
11:37	16.10	5.02	0.00	70	57.20	0.841	1 L M	10.83	60.32	Refine_____
11:41	20.61	4.52	0.00	77	58.11	0.862	1 L M	15.21	58.05	_____
11:43	22.78	0.00	2.17	69	0.00			15.21	0.00	CHG_2__ 60.1
11:43	22.85	0.07	0.00	69	17.28	0.696	1 S M	15.23	41.72	_____
11:45	24.28	1.43	0.00	71	63.02	0.801	1 S M	16.73	73.67	_____
11:50	29.30	5.01	0.00	76	57.60	0.833	1 L M	21.55	62.69	_____
11:52	31.56	2.27	0.00	78	59.17	0.857	1 L M	23.78	59.62	_____
11:57	36:58	5.02	0.00	81	66.14	0.819	1 S M	29.31	71.06	_____
12:01	40.74	4.17	0.00	83	65.27	0.812	1 S M	33.84	70.91	_____
12:01	40.81	0.07	0.00	83	45.36	0.823	1 L M	33.89	55.35	_____
12:05	44.43	0.00	3.62	76	0.00			33.89	0.00	Tap_T_____

total lime weight 0.0
total coke weight 0.0
total oxygen 0
total gas 133

cold charge weight 199.2
hot charge weight 0.0
total charge weight 199.2

** HEAT ELECTRICAL SUMMARY **
Heat No.: 114409 Time: 12:05

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	Floor
UNDEF	1 S	10.7	31.6	21.69	65.07	46.55	80.01	0.813	10.7	10.7	10.7	71.8
UNDEF	1 L	7.3	21.7	22.40	57.98	37.31	68.94	0.841	7.3	7.3	7.3	63.4
BOREIN	1 S	1.1	3.4	21.62	60.76	47.86	77.35	0.786	1.1	1.1	1.1	72.7
BOREIN	1 L	2.0	5.9	22.51	55.78	37.88	67.43	0.827	2.0	2.0	2.0	62.8
MELT	1 L	3.1	9.2	22.45	58.60	37.62	69.64	0.842	3.1	3.1	3.1	62.1
REFINE	1 L	9.5	28.2	22.30	57.63	35.56	67.72	0.851	9.5	9.5	9.5	58.2
		33.8		22.13	60.14	40.16	72.32	0.832	33.8	33.8	33.8	64.3

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114409 Date: 11-07-01 Shift: 2
Melter: 1 First Helper: 1 Product Code: 7168
Tap Time: 12:05 Prev Heat Tapped: 11:21 Time Tap to Tap: 0 hr. 44 m

CHARGE	TIME	WEIGHT
1	11:26	139.2
2	11:43	60.0
3	none	none
4	none	none
TOTAL(klbs)		199.2
TOTAL(tons)		99.6

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	33.89
KWH/TON:	340.3

HEATS ON LI
DELTA LIFE
CHG WT(klbs

Chemistry File Heat Number 114409 has incorrect number of characters

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114410 Grade: X-60-1 Grade No: 7168

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 0
Tap Time: 1249

Heats on Delta: 405 Last Heat Tapped: 1243

Total Charge Wt	0.0	Furnace Lime Lbs	0
Hot Metal Wt	0.0	Oxygen Batch	0
Pour Back	0.0	Nat. Gas Batch	132
		Tap Temp	0
Melt Efficiency Rating	0.00	Total MWH	3.2
Charge to Tap Time	769	Avg. MW	64.3
Tap to Tap Time	6	KWH/Ton	++.0
Total Delay Time	3.0	Avg. Pwr. Factor	0.80

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st = 139,500
2nd = 60,400

Oregon Steel Mills, Portland Oregon
* * * * * * H E A T L O G * * * * * *

Heat No. 114410 BOH 11/07 at 12:43 Product Code 7168
Melter 1 1st Helper 1 Ladle Temp 0 190 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
12:43	0.00	0.00	0.00	0	0.00			0.00	0.00	Inspect_Fce
12:43	0.12	0.12	0.00	100	63.66	0.816	1 S M	0.12	69.27	Holding____
12:46	2.92	2.80	0.00	100	64.57	0.804	1 S M	3.14	71.11	Bore_In____
12:46	3.03	0.12	0.00	100	61.93	0.815	1 S M	3.26	68.05	Melt_____
12:46	3.05	0.02	0.00	100	43.20	0.876	1 L M	3.27	43.92	Melt_____
12:49	6.02	0.00	2.97	51	0.00			3.27	0.00	Tap_T_____

total lime weight 0.0
total coke weight 0.0
total oxygen 0
total gas 132

cold charge weight 0.0
hot charge weight 0.0
total charge weight 0.0

** HEAT ELECTRICAL SUMMARY **
Heat No.: 114410 Time: 12:49

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	Floc
BOREIN	1 S	2.9	95.6	21.57	64.53	47.71	80.25	0.804	2.9	2.9	2.9	71.3
MELT	1 S	0.1	3.8	21.93	61.93	44.06	76.01	0.815	0.1	0.1	0.1	67.3
MELT	1 L	0.0	0.5	23.38	43.20	23.76	49.30	0.876	0.0	0.0	0.0	43.2
		3.0		21.59	64.32	47.44	79.92	0.805	3.1	3.1	3.1	71.1

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114410 Date: 11-07-01 Shift: 2
Melter: 1 First Helper: 1 Product Code: 7168
Tap Time: 12:49 Prev Heat Tapped: 12:43 Time Tap to Tap: 0 hr. 6 mi

CHARGE	TIME	WEIGHT
1	none	none
2	none	none
3	none	none
4	none	none
******		******
TOTAL(klbs)		0.0
TOTAL(tons)		0.0

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	3.27
KWH/TON:	0.0

HEATS ON LINI

DELTA LIFE:

CHG WT(klbs):

Chemistry File Heat Number 114410 has incorrect number of characters

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114411 Grade: X-60-1 Grade No: 7168

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 1254
Tap Time: 1336

Heats on Delta: 406 Last Heat Tapped: 1249

Total Charge Wt	: 200.0	Furnace Lime Lbs	: 0
Hot Metal Wt	: 0.0	Oxygen Batch	: 0
Pour Back	: 0.0	Nat. Gas Batch	: 142
		Tap Temp	: 0
Melt Efficiency Rating	: 0.00	Total MWH	: 35.7
Charge to Tap Time	: 42	Avg. MW	: 59.7
Tap to Tap Time	: 47	KWH/Ton	: 357.0
Total Delay Time	: 11.4	Avg. Pwr. Factor	: 0.83

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st = 138,800
2nd = 60,900

Oregon Steel Mills, Portland Oregon

* * * * * * HEAT LOG * * * * * *

Heat No. 114411 BOH 11/07 at 12:49 Product Code 7168
Melter 1 1st Helper 1 Ladle Temp 0 191 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
12:54	5.03	0.00	5.03	0	0.00			0.00	0.00	Inspect_Fce
12:54	5.12	0.00	0.08	0	0.00			0.00	0.00	CHG_1__140.7
12:56	7.08	1.97	0.00	28	62.05	0.797	1 S M	2.03	72.77	Bore_In_____
12:57	8.18	1.10	0.00	37	55.98	0.833	1 L M	3.06	62.60	Bore_In_____
13:00	11.28	3.10	0.00	55	57.15	0.842	1 L M	6.01	61.76	Melt_____
13:05	16.22	4.93	0.00	68	57.22	0.845	1 L M	10.72	60.95	Refine_____
13:10	21.14	4.92	0.00	76	59.38	0.858	1 L M	15.59	60.34	_____
13:10	21.15	0.02	0.00	76	30.24	0.894	1 L M	15.59	29.30	_____
13:12	22.74	0.00	1.58	71	0.00			15.59	0.00	CHG_2__ 60.7
13:13	23.82	1.08	0.00	72	57.85	0.782	1 S M	16.64	71.17	_____
13:18	28.74	4.92	0.00	77	53.94	0.823	1 L M	21.06	61.86	_____
13:21	32.29	3.55	0.00	79	58.46	0.847	1 L M	24.52	60.93	_____
13:26	37.20	4.92	0.00	82	65.97	0.816	1 S M	29.92	71.26	_____
13:31	42:12	4.92	0.00	84	65.88	0.814	1 S M	35.32	71.23	_____
13:32	42.49	0.37	0.00	84	60.09	0.807	1 S M	35.69	68.12	_____
13:32	42.55	0.07	0.00	84	35.64	0.838	1 L M	35.73	47.11	_____
13:36	47.20	0.00	4.65	76	0.00			35.73	0.00	Tap_T_____

total lime weight 0.0
total coke weight 0.0
total oxygen 0
total gas 142

cold charge weight 200.0
hot charge weight 0.0
total charge weight 200.0

** HEAT ELECTRICAL SUMMARY **
Heat No.: 114411 Time: 13:36

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	----- Floor
UNDEF	1 S	11.3	31.5	21.66	64.96	46.67	79.99	0.812	11.2	11.3	11.3	71.4
UNDEF	1 L	8.5	23.8	22.42	55.67	36.94	66.81	0.833	8.4	8.5	8.5	62.6
BOREIN	1 S	2.0	5.5	21.70	62.05	47.03	77.86	0.797	1.9	2.0	2.0	73.8
BOREIN	1 L	1.1	3.1	22.52	55.98	37.20	67.21	0.833	1.1	1.1	1.1	62.7
MELT	1 L	3.1	8.6	22.44	57.15	36.68	67.91	0.842	3.1	3.1	3.1	61.8
REFINE	1 L	9.9	27.5	22.34	58.25	35.85	68.40	0.852	9.9	9.9	9.9	61.7
		35.9		22.13	59.79	40.24	72.07	0.830	35.7	35.9	35.9	65.3

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114411 Date: 11-07-01 Shift: 2
Melter: 1 First Helper: 1 Product Code: 7168
Tap Time: 13:36 Prev Heat Tapped: 12:49 Time Tap to Tap: 0 hr. 47 mi

CHARGE	TIME	WEIGHT
1	12:54	140.0
2	13:12	60.0
3	none	none
4	none	none
TOTAL(klbs)		200.0
TOTAL(tons)		100.0

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	35.73
KWH/TON:	357.3

* HEATS ON LIN
* DELTA LIFE:
• CHG WT(klbs):

Chemistry File Heat Number 114411 has incorrect number of characters

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114412 Grade: X-60-1 Grade No: 7168

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 1350
Tap Time: 1432

Heats on Delta: 407 Last Heat Tapped: 1336

Total Charge Wt	: 280.0	Furnace Lime Lbs	: 0
Hot Metal Wt	: 0.0	Oxygen Batch	: 0
Pour Back	: 0.0	Nat. Gas Batch	: 143
		Tap Temp	: 0
Melt Efficiency Rating	: 0.00	Total MWH	: 36.7
Charge to Tap Time	: 42	Avg. MW	: 59.8
Tap to Tap Time	: 56	KWH/Ton	: 262.1
Total Delay Time	: 19.7	Avg. Pwr. Factor	: 0.83

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st = 139,800
2nd = 60,000

Oregon Steel Mills, Portland Oregon
* * * * * * H E A T L O G * * * * * *

Heat No. 114412 BOH 11/07 at 13:36 Product Code 7168
Melter 1 1st Helper 1 Ladle Temp 0 192 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
13:50	14.12	0.00	14.12	0	0.00			0.00	0.00	Inspect_Fce_
13:50	14.18	0.00	0.07	0	0.00			0.00	0.00	CHG_1__140.[illegible]
13:50	14.25	0.07	0.00	0	15.66	0.649	1 S M	0.02	41.29	Bore_In_____
13:51	15.15	0.90	0.00	6	60.67	0.779	1 S M	0.93	73.64	Bore_In_____
13:54	17.45	2.30	0.00	19	56.03	0.832	1 L M	3.08	62.07	Bore_In_____
13:57	20.55	3.10	0.00	31	57.93	0.839	1 L M	6.07	61.91	Melt_____
14:02	25.47	4.92	0.00	44	56.87	0.844	1 L M	10.73	60.67	Refine_____
14:06	30.19	4.72	0.00	53	57.41	0.850	1 L M	15.24	60.49	_____
14:08	32.00	0.00	1.82	50	0.00			15.24	0.00	CHG_2__140.[illegible]
14:09	32.45	0.45	0.00	51	53.42	0.804	1 S M	15.64	67.56	_____
14:13	36.80	4.35	0.00	57	56.73	0.830	1 L M	19.76	64.29	_____
14:17	41.40	4.60	0.00	61	58.52	0.845	1 L M	24.24	61.17	_____
14:22	46.34	4.93	0.00	65	66.09	0.813	1 S M	29.68	71.66	_____
14:27	51:25	4.92	0.00	69	66.74	0.821	1 S M	35.15	71.68	_____
14:28	52.42	1.17	0.00	69	64.02	0.815	1 S M	36.39	70.10	_____
14:28	52.49	0.07	0.00	70	40.40	0.812	1 L M	36.44	53.50	_____
14:30	53.75	0.00	1.27	68	0.00			36.44	0.00	_____
14:30	53.84	0.08	0.00	68	35.86	0.879	1 L M	36.49	38.03	_____
14:30	53.95	0.12	0.00	68	58.32	0.840	1 S M	36.60	62.11	_____
14:30	54.07	0.12	0.00	68	50.61	0.845	1 L M	36.70	55.51	_____
14:32	56.45	0.00	2.38	65	0.00			36.70	0.00	Tap_T_____

total lime weight 0.0
total coke weight 0.0
total oxygen 0
total gas 143

cold charge weight 280.0
hot charge weight 0.0
total charge weight 280.0

** HEAT ELECTRICAL SUMMARY **
Heat No.: 114412 Time: 14:32

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	----- Floor
UNDEF	1 S	11.6	31.5	21.70	65.59	46.42	80.35	0.816	11.5	11.6	11.6	71.4
UNDEF	1 L	9.2	25.0	22.46	57.24	37.25	68.30	0.838	9.2	9.2	9.2	64.[illegible]
BOREIN	1 S	1.0	2.6	21.87	57.57	46.69	74.12	0.777	0.9	1.0	1.0	73.2
BOREIN	1 L	2.3	6.2	22.59	56.03	37.33	67.33	0.832	2.3	2.3	2.3	62.4
MELT	1 L	3.1	8.4	22.51	57.93	37.57	69.05	0.839	3.1	3.1	3.1	61.[illegible]
REFINE	1 L	9.6	26.2	22.27	57.13	35.85	67.45	0.847	9.6	9.6	9.6	61.[illegible]
		36.8		22.17	59.83	40.05	72.00	0.831	36.7	36.8	36.8	65.[illegible]

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114412 Date: 11-07-01 Shift: 2
Melter: 1 First Helper: 1 Product Code: 7168
Tap Time: 14:32 Prev Heat Tapped: 13:36 Time Tap to Tap: 0 hr. 56 mi

CHARGE	TIME	WEIGHT
1	13:50	140.0
2	14:08	140.0
3	none	none
4	none	none
TOTAL(klbs)		280.0
TOTAL(tons)		140.0

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	36.70
KWH/TON:	262.1

* HEATS ON LINI
* DELTA LIFE:
* CHG WT(klbs):

Chemistry File Heat Number 114412 has incorrect number of characters

O S M #3 F U R N A C E H E A T L O G

HEAT SUMMARY

Heat Number: 114413 Grade: OR 500-2 Grade No: 9108

Crew No : 1 Heat Tap Date: 11/07/2001 Charge Time: 1436
Tap Time: 1515
Heats on Delta: 408 Last Heat Tapped: 1432

Total Charge Wt	: 190.0	Furnace Lime Lbs	: 5
Hot Metal Wt	: 0.0	Oxygen Batch	: 0
Pour Back	: 0.0	Nat. Gas Batch	: 136
		Tap Temp	: 0
Melt Efficiency Rating	: 0.00	Total MWH	: 35.6
Charge to Tap Time	: 39	Avg. MW	: 61.3
Tap to Tap Time	: 43	KWH/Ton	: 374.7
Total Delay Time	: 8.6	Avg. Pwr. Factor	: 0.84

CHEMISTRY SUMMARY

LADLE ADDITIONS:

1st = 140,800
2nd = 49,900

Oregon Steel Mills, Portland Oregon

* * * * * * H E A T L O G * * * * * *

Heat No. 114413 BOH 11/07 at 14:32 Product Code 9108

Melter 1 1st Helper 1 Ladle Temp 0 193 heats on lance 8

CLOCK TIME	---TIME (MINUTES)-- TOTAL	ON	OFF	TU %	AVG. MW	AVG. P.F.	TAP/ ARC	ACC. MWHR	AVG. KA	EVENT/DELAY DESCRIPTION
14:36	3.70	0.00	3.70	0	0.00			0.00	0.00	Inspect_Fce_
14:36	3.92	0.00	0.22	0	0.00			0.00	0.00	CHG_1__140.
14:36	4.00	0.00	0.08	0	0.00			0.00	0.00	
14:37	4.87	0.87	0.00	18	62.13	0.786	1 S M	0.90	74.06	Bore_In
14:39	7.17	2.30	0.00	44	56.56	0.836	1 L M	3.07	61.87	Bore_In
14:39	7.28	0.12	0.00	45	58.32	0.826	1 L M	3.18	65.07	Lime_#_
14:42	10.28	3.00	0.00	61	58.20	0.847	1 L M	6.09	61.30	Melt
14:47	15.20	4.92	0.00	74	59.61	0.864	1 L M	10.97	59.99	Refine
14:51	18.40	3.20	0.00	78	60.16	0.868	1 L M	14.18	59.41	
14:52	19.90	0.00	1.50	72	0.00			14.18	0.00	CHG_2__ 50.
14:54	21.77	1.87	0.00	75	58.86	0.803	1 S M	16.01	71.70	
14:59	26.68	4.92	0.00	79	57.53	0.850	1 L M	20.73	60.67	
15:00	27.98	1.30	0.00	80	60.12	0.864	1 L M	22.03	59.15	
15:05	32:90	4.92	0.00	83	66.58	0.822	1 S M	27.49	71.22	
15:10	37.82	4.92	0.00	85	68.37	0.834	1 S M	33.09	71.78	
15:11	39.09	1.27	0.00	86	66.44	0.811	1 S M	34.49	71.71	
15:11	39.30	0.22	0.00	86	55.78	0.837	1 L M	34.69	59.90	
15:11	39.55	0.00	0.25	85	0.00			34.69	0.00	
15:13	40.64	1.08	0.00	86	52.31	0.714	2 L M	35.64	71.82	
15:15	43.52	0.00	2.88	80	0.00			35.64	0.00	Tap_T

total lime weight 4.7
total coke weight 0.0
total oxygen 0
total gas 136

cold charge weight 190.0
hot charge weight 0.0
total charge weight 190.0

** HEAT ELECTRICAL SUMMARY **

Heat No.: 114413 Time: 15:15

Mode	Tap/ Arc	--Power On- Min.	Pct.	Avg. KV	Avg. MW	Avg. MVAR	Avg. MVA	Avg. P.F.	--Arc Time Min.-- Floor	Ctr.	Pit	Floor
UNDEF	1 S	13.0	37.2	21.72	66.13	45.67	80.37	0.823	12.8	13.0	13.0	72.
UNDEF	1 L	6.4	18.4	22.37	57.99	35.58	68.04	0.852	6.4	6.4	6.4	60.
UNDEF	2 L	1.1	3.1	21.42	52.31	51.24	73.22	0.714	1.1	1.1	1.1	72.
BOREIN	1 S	0.9	2.5	21.75	62.13	48.84	79.03	0.786	0.9	0.9	0.9	73.
BOREIN	1 L	2.3	6.6	22.58	56.56	37.10	67.64	0.836	2.3	2.3	2.3	63.
MELT	1 L	3.1	8.9	22.49	58.20	36.72	68.82	0.846	3.1	3.1	3.1	62.
REFINE	1 L	8.1	23.3	22.33	59.83	34.58	69.10	0.866	8.1	8.1	8.1	60.
		34.9		22.10	61.30	40.12	73.26	0.837	34.7	34.9	34.9	66.

Oregon Steel Mills, Portland Oregon

** CHEMISTRY REPORT **

Heat No.: 114413 Date: 11-07-01 Shift: 3
Melter: 1 First Helper: 1 Product Code: 9108
Tap Time: 15:15 Prev Heat Tapped: 14:32 Time Tap to Tap: 0 hr. 44 m

CHARGE	TIME	WEIGHT
1	14:36	140.0
2	14:52	50.0
3	none	none
4	none	none
TOTAL(klbs)		190.0
TOTAL(tons)		95.0

TAP TEMP:	0
LADLE TEMP:	0
MWH USED:	35.64
KWH/TON:	375.2

HEATS ON LIN
DELTA LIFE
CHG WT(klbs

Chemistry File Heat Number 114413 has incorrect number of characters

MATERIAL SAFETY DATA SHEET

MSDS ISSUE DATE: AUGUST 17, 1995

SECTION I CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: ELECTRIC ARC FURNACE DUST (KO61)

ORGANIZATION MSDS: #: SAFETY DATA FILE K061 95. SAFETY FILE INDEX #2.14.4.1

MANUFACTURER'S NAME: OREGON STEEL MILLS, INC.

EMERGENCY PHONE NUMBER: 503-286-9651

ADDRESS: PO BOX 2750 PORTLAND, OREGON 97208

HMIS CODES
HEALTH: 2
FIRE: 0
REACTIVITY: 0
CHRONIC EFFECTS: 4

MANUFACTURER'S CODE: NE

CHEMICAL NAME/CLASSIFICATION: DUST CONTAINING METALS & INORGANICS

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

METALS LISTED BELOW ARC PRESENT MOSTLY AS OXIDES. IN ADDITION, FREE METALS MAY ALSO BE PRESENT BUT IN SMALL AND VARYING AMOUNTS.

INGREDIENT	CAS#	PERCENT (AS OXIDE)	OSHA PEL (MG/M3)	ACGIH TLV (MG/M3)
IRON OXIDE-FExOy FERRIC OXIDE FERROUS OXIDE	 1309-37-1 1345-25-1	35-55	1C	5
ZINC OXIDE-ZnO	1314-13-2	14-25	15 TOTAL DUST 5 RESPIRABLE FRACTION	10 DUST, 5 FUME
CALCIUM OXIDE-CaO	1305-78-8	5-16	5	2
MANGANESE OXIDE-MnxOy		3-5	5	0.2 (PROPOSED)

MANGANESE OXIDE MANGANESE DIOXIDE	1317-35-7 1313-13-9			
SILICA OXIDE-SixOy SILICON DIOXIDE	7631-86-9	1-5	30mg/m3 / %SiO2+2	0.1 RESPIRABLE
MAGNESIUM OXIDE-MgO	1309-48-4	2-4	15	10 FUME
LEAD OXIDE-PbxOy LEAD DIOXIDE	1309-60-0	1.8-3.3	0.05	0.05
SODIUM OXIDE Na2O	1313-59-3	1-6	15(1)	10(2)
SULFUR - S	7704-34-9*	1-3	15(1)	10(2)
ALUMINUM OXIDE-A1203	1344-28-1	1-2	15 DUST RESPIRABLE	10 DUST
POTASSIUM OXIDE-KxO		0.5-2	15(1)	10(2)
CHROME OXIDE-CrxOy		0.3-0.5		
CHROMIC OXIDE	1308-38-9		0.5	0.5
CHROMIUM METAL	-		1	0.5
Cr(VI)COMPOUNDS	-		0.1	0.01
COPPER OXIDE-CuxOy CUPRIC OXIDE	1317-38-0	0.2-0.4	1 DUST, 0.1FUME	1 DUST, 0.2FUME
CALCIUM OXIDE-CdO	1306-19-0	0.05-0.15	0.005	0.01 DUST, 0.002 RESPIRABLE

*INDICATES CAS% FOR THE METAL. CALC. STANDS FOR CALCULATION. C = CEILING LEVEL STEL = SHORT TERM EXPOSURE LIMIT.

(1) NUISANCE DUST LIMIT APPLIED TO PARTICULATE NOT OTHERWISE REGULATED.

(2) PARTICULATES NOT OTHERWISE CLASSIFIED.

SECTION 3 HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

EYE: WILL CAUSE IRRITATION TO THE EYES.

SKIN: PROLONGED OR EXTENDED CONTACT WITH THE DUST IRRITATE THE SKIN. ARSENIC IS CAPABLE OF PRODUCING KERTOSES, ESPECIALLY OF THE PALMS AND

SOLES. ECZEMATOUS DERMATITIS HAS BEEN REPORTED FOR TRIVALENT CHROMIUM (III)

COMPOUNDS. CHROME (VI) MAY CAUSE IRRITANT AND ALLERGIC CONTACT DERMATITIS.

INGESTION: CADMIUM IS HIGHLY IRRITATING TO THE STOMACH LINING. SWALLOWING THE DUST MAY CAUSE SORE THROAT, NAUSEA, VOMITING, ABDOMINAL PAIN, DIARRHEA, AND PAIN IN THE EXTREMITIES AND JOINTS. ACUTE ENCEPHALOPATHY IS ALSO ASSOCIATED WITH EXTREMELY HIGH LEAD DOSES. HIGH DOSES OF ARSENIC CAN BE FATAL.

INHALATION: ACUTE EFFECTS ARE THE SAME AS THOSE OF INGESTION. ADDITIONALLY, MAY CAUSE DRY THROAT, COUGH, HEADACHE, SHORTNESS OF BREATH, CHEST PAINS AND CHILLS. INHALATION OF ZINC, MAGNESIUM AND MANGANESE MAY RESULT IN METAL FUME FEVER. EXTREME OVEREXPOSURE TO CADMIUM MAY RESULT IN SEVERE LUNG IRRITATION AND PULMONARY EDEMA THAT CAN BE FATAL. THIS IS PRECEDED BY A SENSATION OF THROAT CONSTRICTION, METALLIC TASTE, AND COUGH. SYMPTOMS MAY PROGRESS TO SHORTNESS OF BREATH, CHEST PAIN, FLU-LIKE SYMPTOMS, WITH WEAKNESS, FEVER, HEADACHE, AND CHILLS.

CHRONIC (AND CANCER) INFORMATION: PROLONGED EXPOSURE TO LEAD MAY CAUSE FATIGUE, GASTROINTESTINAL PAIN, ANEMIA, POSSIBLE CENTRAL NERVOUS SYSTEM AND KIDNEY DAMAGE. LEAD AND LEAD COMPOUNDS ARE LISTED BY INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) AS POSSIBLE CARCINOGENS. REPEATED OR LONG-TERM EXPOSURE TO CADMIUM MAY RESULT IN KIDNEY DAMAGE AND INCREASED RISK OF PROSTRATE, RESPIRATORY AND GENITOURINARY CANCERS. LONG-TERM EXPOSURE TO ARSENIC IS ASSOCIATED WITH LUNG CANCER. BOTH CADMIUM AND ARSENIC ARE DESIGNATED AS CARCINOGENS BY OSHA. THE IARC AND THE NATIONAL TOXICOLOGY PROGRAM (NTP) CONSIDER CHROME (VI) AS CARCINOGENIC TO HUMANS AND CRYSTALLIZED SILICON DIOXIDE AS PROBABLY CARCINOGENIC TO HUMANS. CRYSTALLINE SILICON DIOXIDE MAY CAUSE SILICOSIS. MANGANESE MAY RESULT IN DAMAGE TO THE LUNGS, KIDNEYS, BLOOD, AND CENTRAL NERVOUS SYSTEM.

TERATOGENIC/MUTAGENIC INFORMATION: MUTAGENIC EFFECTS DATA HAS BEEN CITED FOR LEAD IN RTECS.

REPRODUCTION INFORMATION: REPRODUCTIVE EFFECTS DATA HAS BEEN CITED FOR LEAD

IN RTECS.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: PERSONS WITH PRE-EXISTING HEART CONDITIONS OR IMPAIRED RESPIRATORY FUNCTION.

EYE CONTACT: IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES, AREFULLY LIFTING EYELID TO EXPOSE THE EYE TO CONTACT WITH THE WATER. REMOVE CONTACT LENS, IF PRESENT, AND REPEAT WITH AN ADDITIONAL 15 MINUTE FLUSH. IF IRRITATION DEVELOPS OR SYMPTOMS PERSIST, GET MEDICAL ASSISTANCE.

SKIN CONTACT: WASH THOROUGHLY WITH SOAP AND WATER AFTER SKIN CONTACT.

INHALATION: IF AFFECTED, REMOVE TO FRESH AIR. GIVE CPR/ARTIFICIAL RESPIRATION IF NOT BREATHING. PROVIDE OXYGEN IF BREATHING IS DIFFICULT. IF IRRITATION DEVELOPS OR SYMPTOMS PERSIST, GET MEDICAL ASSISTANCE.

IF SWALLOWED: DO NOT INDUCE VOMITING. IF PERSON IS ALERT AND NOT CONVULSING, ADMINISTER 6 TO 8 GLASS OF WATER TO DILUTE THE MATERIAL. THEN CALL CLOSEST POISON CONTROL CENTER. IF SPONTANEOUS VOMITING OCCURS, HAVE PERSON LEAN FORWARD TO AVOID BREATHING IN OF EMESIS. RINSE MOUTH AND ADMINISTER MORE WATER.

NOTES TO PHYSICIAN: NONE GIVEN.

USERS SHOULD COMPLY WITH APPLICABLE OSHA AND RCRA AND OTHER STATE AND FEDERAL REGULATIONS INCLUDING (BUT NOT LIMITED TO) 29 CFR 1910.1000 (AIR CONTAMINANTS), 29 CFR 1910.1025 (LEAD), 29CFR 1910.1027 (CADMIUM), 29 CFR 1910.1200 (HAZARD COMMUNICATION) AND 40 CFR 262 ET AL. (HAZARDOUS WASTE).

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: THIS MATERIAL IS COMPLETELY NON-COMBUSTIBLE. FOR FIRE IN CLOSE PROXIMITY, USE CO2, FOAM, DRY CHEMICAL OR WATER SPRAY.

SPECIAL FIREFIGHTING METHODS: FIREFIGHTERS SHOULD USE SELF-CONTAINED BREATHING APPARATUS.

UNUSUAL FIRE & EXPLOSION HAZARDS: NONE KNOWN

SECTION 6 ACCIDENTAL RELEASE MEASURES

SPILL/CLEANUP PROCEDURE: PROMPTLY CLEAN UP MATERIAL SPILLS, USE WATER TO WET DOWN TO MINIMIZE DUST DURING CLEANUP. SEE SECTION 8 FOR EXPOSURE CONTROL AND PERSONAL PROTECTION INFORMATION. THIS MATERIAL IS A CERCLA AND SARA TITLE III HAZARDOUS SUBSTANCE. SPILLS OF THIS MATERIAL IN EXCESS OF THE REPORTABLE QUANTITY OF 10 LBS (40 CFR 302 AND 40 CFR 355) MAY REQUIRE NOTIFICATION OF FEDERAL, STATE, AND/OR LOCAL AGENCIES.

USERS SHOULD COMPLY WITH APPLICABLE OSHA AND RCRA AND OTHER STATE AND FEDERAL REGULATIONS INCLUDING (BUT NOT LIMITED TO) 29 CFR 1910.1000 (AIR CONTAMINANTS), 29 CFR 1910.1025 (LEAD), 29 CFR 1910.1027 (CADMIUM) AND 29 CFR 1910.1200 (HAZARD COMMUNICATION), 40 CFR 262 ET AL. (HAZARDOUS WASTE).

SECTION 7 HANDLING AND STORAGE

DO NOT BREATHE DUST.

IF USED OR HANDLED IN A MANNER WHICH GENERATES DUST, SEE SECTION 8 FOR

SPECIFIC PERSONAL PROTECTION INFORMATION.

PREVENT SKIN CONTACT, INGESTION AND INHALATION WHEN HANDLING MATERIAL.

STORE ONLY IN ACCORDANCE WITH THE PROVISIONS OF RCRA (INCLUDING BUT NOT LIMITED TO 40 CFR 260-268) AND APPLICABLE STATE REGULATIONS.

PROMPTLY CLEAN UP MATERIAL SPILLS, USE WATER TO WET DOWN TO MINIMIZE DUST DURING CLEANUP. SEE SECTION 6 FOR ACCIDENTAL RELEASE MEASURES.

REFER TO SECTION 11 FOR DISPOSAL INFORMATION.

USERS SHOULD COMPLY WITH APPLICABLE OSHA AND RCRA AND OTHER STATE AND FEDERAL REGULATIONS INCLUDING (BUT NOT LIMITED TO) 29 CFR 1910.1000 (AIR CONTAMINANTS), 29 CFR 1910.1025 (LEAD), 29 CFR 1910.1027 (CADMIUM) AND 29 CFR 1910.1200 (HAZARD COMMUNICATION), 40 CFR 262 ET AL. (HAZARDOUS WASTE).

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

RESPIRATORY PROTECTION: DO NOT BREATHE DUST.

IF CONCENTRATIONS IS GREATER THAN THE PEL, BUT LESS THAN 10 TIMES PEL, USE A NIOSH APPROVED HALF-MASK RESPIRATOR WITH HEPA CARTRIDGE.

FOR CONCENTRATIONS ABOVE 10 TIMES PEL, BUT LESS THAN 50 TIMES PEL USE A NIOSH APPROVED FULL FACE RESPIRATOR WITH HEPA CARTRIDGE.

WHERE AIRBORNE CONCENTRATION MAY EXCEED 50 TIMES PEL, USE A SUPPLIED-AIR RESPIRATOR.

VENTILATION: USE LOCAL OR GENERAL VENTILATION TO MAINTAIN AIRBORNE CONCENTRATIONS BELOW THE PEL. IF VENTILATION FAILS TO MAINTAIN CONCENTRATIONS BELOW THE PEL, RESPIRATORY PROTECTION IS REQUIRED BY FEDERAL AND/OR STATE REGULATIONS; SEE RESPIRATORY PROTECTION INFORMATION ABOVE.

RECOMMENDED GLOVES: RUBBER GLOVES ARE RECOMMENDED

EYE PROTECTION: CHEMICAL SAFETY GOGGLES ARE REQUIRED IF FULL FACE RESPIRATORY PROTECTION IS NOT WORN.

OTHER PROTECTION: EYE WASH AND SAFETY SHOWER SHOULD BE NEARBY AND READY FOR USE.

WEAR COVERALLS AND GLOVES AS NECESSARY TO PROVIDE PROTECTION; CLOTHING AND PERSONAL PROTECTIVE EQUIPMENT WHICH HAS COME IN CONTACT WITH THIS MATERIAL MAY REQUIRE SPECIAL HANDLING AS SPECIFIED IN THE REGULATIONS REFERENCED BELOW.

USERS SHOULD COMPLY WITH APPLICABLE OSHA AND RCRA AND OTHER STATE AND FEDERAL REGULATIONS INCLUDING (BUT NOT LIMITED TO) 29 CFR 1910.1000 (AIR CONTAMINANTS), 29 CFR 1910.1023 (LEAD), 29 CFR 1910.1027 (CADMIUM) AND 29 CFR 1910.1200 (HAZARD COMMUNICATION), 40 CFR 262 ET AL. (HAZARDOUS WASTE).

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: FINE, GRAY DUST

ODOR: NONE

BOILING POINT: NA DEG F.

VAPOR PRESSURE (mm HG): NA mm AT DEG F.

VAPOR DENSITY (AIR = 1): NA

SPECIFIC GRAVITY: 1.3 (WATER = 1)

PERCENT VOLATILE: NA %

EVAPORATION RATE: NA REFERENCE: NA

WATER SOLUBILITY: N (C = COMPLETE, P = PARTIAL, N = NEGLIGIBLE, D = DISPERSION)

FLASH POINT: NA DEG F. METHOD.

AUTO IGNITION TEMPERATURE: NG DEG F.

EXPLOSION LIMITS:
LEL: NA UEL: NA

SECTION 10 STABILITY AND REACTIVITY

STABILITY: STABLE

INCOMPATIBILITY: NONE KNOWN

CONDITIONS TO AVOID: NONE KNOWN.

HAZARDOUS DECOMPOSITION PRODUCTS: NONE

HAZARDOUS POLYMERIZATION: NO

SECTION 11 DISPOSAL CONSIDERATIONS

EPA WASTE CODES: K061

DOT NUMBER: OTHER REGULATED MATERIAL (ORM)

DOT HAZARD CLASS/HAZARD LABEL: LABEL IN ACCORDANCE WITH 49 CFR 173.

USERS SHOULD COMPLY WITH APPLICABLE OSHA AND RCRA AND OTHER STATE AND FEDERAL REGULATIONS INCLUDING (BUT NOT LIMITED TO) 29 CFR 1910.1000 (AIR CONTAMINANTS), 29 CFR 1910.1023 (LEAD),29 CFR 1910.1027 (CADMIUM) AND 29 CFR 1910.1200 (HAZARD COMMUNICATION), 40 CFR 262 ET AL. (HAZARDOUS WASTE).

OREGON STEEL MILLS HAS PREPARED THIS INFORMATION BASED ON ITS REASONABLE REVIEW OF AVAILABLE INFORMATION RELATING TO THE CHEMICALS THAT MAKE UP THE PRODUCT WHICH UNDERLYING INFORMATION WAS NOT CREATED OR PREPARED BY OREGON STEEL MILLS. ALTHOUGH OREGON STEEL MILLS PROVIDES THIS INFORMATION AS A PUBLIC SERVICE, IT DOES NOT REPRESENT OR WARRANT HE ACCURACY, COMPLETENESS OR APPLICABILITY OF THE INFORMATION CONTAINED HEREIN. OREGON STEEL MILLS DOES NOT WARRANT THE FITNESS OF THE PRODUCT FOR ANY PARTICULAR USE AND HAS NOT EVALUATED THE HAZARDS ASSOCIATED WITH ANY PARTICULAR USES OF THE PRODUCT. ALL EMPLOYERS USING THE PRODUCT SHOULD PERFORM ALL REVIEW AND TESTING AND TAKE ALL PRECAUTIONS REQUIRED TO PROTECT THEIR EMPLOYEES FROM ANY HAZARDS ASSOCIATED WITH THEIR USE OF THE PRODUCT.

N = NO
Y = YES
UN = UNKNOWN
NA = NOT APPLICABLE
NRG = NOT REGULATED
NE = NOT ESTABLISHED
NG = NOT GIVEN
NR = NOT REQUIRED

PDXI. 196499.1 1956S 0007

HORIZON ENGINEERING
13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 256-6060 • Fax (503) 256-0505
www.horizonengineering.com

OSM Baghouse ΔP in inches of H_2O

11/7/01

Time	~11:03	12:30	
Row #	R1	R2	R3
1	5.1	4.9	5.9
2	4.3	–	4.9
3	5.1	6.1	5.5
4	4.6	5.5	4.8
5	4.9	5.9	–
6	4.5	5.5	5.4
7	3.9	5.2	5.3
8	4.5	5.7	6.3
9	4.0	5.4	6.5
10	3.9	5.0	6.0
11	4.0	5.5	6.6
12	–	5.5	7.1
13	4.5	5.1	6.2
14	5.0	5.6	6.5
15	5.2	5.6	6.2
16	4.2	5.4	6.1

Calibration Information

High-Volume Sampler Calibrations

Pitots

Thermocouples and Indicators

Shortridge Micro manometer

Magnehelic Gauges

Barometer

NO_x Converter Efficiency Data

Calibration Gas Certificates

Audit Sample Results, reporting forms & instructions

High Volume Orifice Calibration Data

File	oct2001	#1192	A=	47.895		#1032	A=	45.260
Date	10-08-01	10-08-01	B=	0.476		10-08-01	B=	0.481
Tester	DBC	Last	A=	47.008		Last	A=	45.507
Analysis	DBC		B=	0.452			B=	0.456
		CHANGE	A=	1.9%		CHANGE	A=	-0.5%
			B=	5.4%			B=	5.5%

General Form Of Solution: Q(68F)=A*(dHo*T68/T)^B : A= Q(68) @ T68F,dHo=1.00

Q=A(dHo)^B

1] ln(Q)=ln(A)+B*ln(dHo)

2] Z=ln(Q)
W=ln(dHo)
C1=ln(A)
C2=B

3] Z=C1+C2(W)

N	W	C1	Z
W	W²	C2	WZ

Point	dHo (in H2O)	Q (cfm) @To=68F	Q (cfm) Calculated	Difference %
1	0.100	15.82	15.99	1.1%
2	0.100	15.86	15.99	0.9%
3	0.100	16.50	15.99	-3.0%
4	0.200	22.23	22.25	0.1%
5	0.200	22.07	22.25	0.8%
6	0.200	21.65	22.25	2.8%
7	0.400	31.33	30.96	-1.2%
8	0.410	31.65	31.32	-1.0%
9	0.410	31.80	31.32	-1.5%
10	0.600	37.48	37.55	0.2%
11	0.600	37.47	37.55	0.2%
12	0.610	37.69	37.85	0.4%
13	0.800	43.34	43.07	-0.6%
14	0.800	43.03	43.07	0.1%
15	0.790	43.05	42.81	-0.6%
16	1.000	47.39	47.89	1.1%
17	1.000	47.44	47.89	1.0%
18	1.000	48.12	47.89	-0.5%

Point	dHo (in H2O)	Q (cfm) @To=68F	Q (cfm) Calculated	Difference %
1	0.100	14.93	14.96	0.2%
2	0.100	14.97	14.96	-0.1%
3	0.100	15.71	14.96	-4.8%
4	0.200	19.81	20.87	5.4%
5	0.200	20.59	20.87	1.4%
6	0.200	20.43	20.87	2.2%
7	0.400	29.41	29.13	-0.9%
8	0.400	29.39	29.13	-0.9%
9	0.400	29.30	29.13	-0.6%
10	0.600	35.45	35.40	-0.1%
11	0.600	35.67	35.40	-0.7%
12	0.600	35.88	35.40	-1.3%
13	0.800	40.50	40.65	0.4%
14	0.800	40.22	40.65	1.1%
15	0.800	40.39	40.65	0.6%
16	1.000	46.22	45.26	-2.1%
17	1.000	44.86	45.26	0.9%
18	1.000	45.32	45.26	-0.1%

Average

No#	W	W²	Z	WZ
1	-2.30	5.3019	2.7613	-6.3582
2	-2.30	5.3019	2.7637	-6.3637
3	-2.30	5.3019	2.8031	-6.4543
4	-1.61	2.5903	3.1016	-4.9918
5	-1.61	2.5903	3.0943	-4.9801
6	-1.61	2.5903	3.0751	-4.9492
7	-0.92	0.8396	3.4446	-3.1562
8	-0.89	0.7949	3.4547	-3.0802
9	-0.89	0.7949	3.4595	-3.0845
10	-0.51	0.2609	3.6239	-1.8512
11	-0.51	0.2609	3.6235	-1.8510
12	-0.49	0.2443	3.6294	-1.7940
13	-0.22	0.0498	3.7691	-0.8411
14	-0.22	0.0498	3.7618	-0.8394
15	-0.24	0.0556	3.7623	-0.8869
16	0.00	0.0000	3.8584	0.0000
17	0.00	0.0000	3.8594	0.0000
18	0.00	0.0000	3.8736	0.0000

No#	W		W²	Z	WZ
18	-16.63		27.0274	61.7193	-51.4816
18	-16.63	C1	61.72		
-16.63	27.03	C2	-51.48		
1	-0.92	C1	3.43	C1=	3.86901
0	11.66	C2	5.55	C2=	0.47632
1	-0.92	C1	3.43	A=	47.89474
0	1	C2	0.48	B=	0.47632
1	0	C1	3.87	@1.00	47.89
0	1	C2	0.48	@0.10	15.99

Average

No#	W	W²	Z	WZ
1	-2.30	5.3019	2.7034	-6.2248
2	-2.30	5.3019	2.7063	-6.2314
3	-2.30	5.3019	2.7544	-6.3423
4	-1.61	2.5903	2.9861	-4.8059
5	-1.61	2.5903	3.0247	-4.8681
6	-1.61	2.5903	3.0172	-4.8560
7	-0.92	0.8396	3.3813	-3.0983
8	-0.92	0.8396	3.3807	-3.0977
9	-0.92	0.8396	3.3776	-3.0948
10	-0.51	0.2609	3.5683	-1.8228
11	-0.51	0.2609	3.5742	-1.8258
12	-0.51	0.2609	3.5800	-1.8288
13	-0.22	0.0498	3.7012	-0.8259
14	-0.22	0.0498	3.6943	-0.8244
15	-0.22	0.0498	3.6987	-0.8253
16	0.00	0.0000	3.8335	0.0000
17	0.00	0.0000	3.8034	0.0000
18	0.00	0.0000	3.8138	0.0000

No#	W		W²	Z	WZ
18	-16.69		27.13	60.60	-50.5722
18	-16.69	C1	60.60		
-16.69	27.13	C2	-50.57		
1	-0.93	C1	3.37	C1=	3.81242
0	11.66	C2	5.61	C2=	0.48088
1	-0.93	C1	3.37	A=	45.25972
0	1	C2	0.48	B=	0.48088
1	-0	C1	3.81	@1.00	45.26
0	1	C2	0.48	@0.10	14.96

Pitot Calibration Calculations

Date 8-Oct-01 Pb= 30.25 in Hg File 12-Dec-01 Ta= 520.0 R

Method 2 section 4, Horizon Shop

Pitot	Tested Last	[Cp] New	[S]
ss7-4	8-Oct-01	**0.81562**	0.00456
ss7-5	9-Oct-01	**0.81041**	0.00771
ss7-6	9-Oct-01	**0.78745**	0.00880
ss7-7	9-Oct-01	**0.83171**	0.00588
ss9-1	9-Oct-01	0.78734	0.00768
ss10-1	10-Dec-01	**0.83477**	0.00193
ss10-2	9-Oct-01	**0.79742**	0.00299
ss10-3	9-Oct-01	**0.80118**	0.00534
3s-1	11-Dec-01	**0.82465**	0.00653
3s-2			
5s-1	9-Oct-01	**0.84199**	0.00913
5s-2			

Pitot	Tested Last	[Cp] New	[S]
9s-1			
6s-1	8-Oct-01	**0.83139**	0.00557
6s-2			
HT-4	10-Dec-01	**0.83782**	0.00469
SR-18	8-Oct-01	**0.82637**	0.00708
SR-36	8-Oct-01	**0.82937**	0.00769
SR-48	8-Oct-01	**0.81569**	0.00000
10-s	10-Dec-01	**0.82809**	0.00625
11-s	10-Oct-01	**0.80294**	0.00539
14-s1	10-Oct-01	**0.82367**	0.00494
14-S2	9-Oct-01	**0.81017**	0.00764
WC 3-5	8-Oct-01	**0.81561**	0.00470

	dPp	dPs	Cp	dS	Avg Cp	S
ss7-4	0.375	0.555	0.81377	0.00184	**0.81562**	0.00456
Pass	0.845	1.230	0.82056	0.00494		
10/8/01	1.200	1.750	0.81980	0.00418		
JKG	1.300	1.950	0.80833	0.00728		
ss7-5	0.385	0.575	0.81009	0.00033	**0.81041**	0.00771
Pass	0.835	1.200	0.82583	0.01541		
10/9/01	1.200	1.800	0.80833	0.00208		
JKG	1.330	2.050	0.79741	0.01300		
ss7-6	0.390	0.640	0.77282	0.01464	**0.78745**	0.00880
Pass	0.795	1.250	0.78952	0.00207		
10/9/01	1.250	1.900	0.80300	0.01554		
JKG	1.350	2.150	0.78448	0.00297		
ss7-7	0.390	0.550	0.83366	0.00195	**0.83171**	0.00588
Pass	0.830	1.200	0.82335	0.00836		
10/9/01	1.250	1.730	0.84153	0.00982		
JKG	1.330	1.900	0.82829	0.00341		
ss9-1	0.390	0.640	0.77282	0.01452	**0.78734**	0.00768
Pass	0.770	1.220	0.78650	0.00084		
10/9/01	1.250	1.950	0.79263	0.00529		
JKG	1.330	2.050	0.79741	0.01007		
ss10-1	0.350	0.495	0.83247	0.00230	**0.83477**	0.00193
Pass	0.850	1.200	0.83321	0.00156		
12/10/01	1.000	1.400	0.83670	0.00193		
JKG	1.250	1.750	0.83670	0.00193		
ss10-2	0.370	0.575	0.79415	0.00327	**0.79742**	0.00299
Pass	0.825	1.280	0.79480	0.00262		
10/9/01	1.200	1.850	0.79733	0.00008		
JKG	1.350	2.050	0.80339	0.00597		
ss10-3	0.380	0.585	0.79790	0.00328	**0.80118**	0.00534
Pass	0.795	1.200	0.80580	0.00462		
10/9/01	1.230	1.850	0.80724	0.00606		
JKG	1.350	2.100	0.79377	0.00741		
3s-1	0.350	0.495	0.83247	0.00782	**0.82465**	0.00653
Pass	0.715	1.050	0.81695	0.00770		
12/11/01	1.130	1.650	0.81928	0.00537		
JKG	1.300	1.850	0.82989	0.00525		
3s-2	na	na	#VALUE!	#VALUE!	#VALUE!	#VALUE!
#VALUE!	na	na	#VALUE!	#VALUE!		
na	na	na	#VALUE!	#VALUE!		
na	na	na	#VALUE!	#VALUE!		
5s-1	0.385	0.525	0.84779	0.00579	**0.84199**	0.00913
Pass	0.765	1.050	0.84503	0.00304		
10/9/01	1.250	1.690	0.85143	0.00943		
JKG	1.350	1.950	0.82373	0.01826		

	dPp	dPs	Cp	dS	Avg Cp	S
6s-1	0.371	0.530	0.82829	0.00310	**0.83139**	0.00557
Pass	0.830	1.200	0.82335	0.00804		
10/08/01	1.180	1.650	0.83721	0.00582		
JKG	1.350	1.890	0.83670	0.00531		
HT-4	0.330	0.470	0.82955	0.00827	**0.83782**	0.00469
Pass	0.750	1.050	0.83670	0.00111		
12/10/01	1.150	1.600	0.83931	0.00150		
JKG	1.350	1.850	0.84570	0.00788		
SR-18	0.380	0.545	0.82666	0.00029	**0.82637**	0.00708
Pass	0.850	1.180	0.84024	0.01387		
10/08/01	1.100	1.610	0.81831	0.00806		
JKG	1.270	1.850	0.82026	0.00611		
SR-36	0.371	0.540	0.82059	0.00878	**0.82937**	0.00583
Pass	0.820	1.150	0.83598	0.00661		
10/08/01	1.150	1.650	0.82650	0.00287		
JKG	1.300	1.830	0.83441	0.00504		
SR-48	0.365	0.545	0.81018	0.00550	**0.81569**	0.00769
Pass	0.795	1.200	0.80580	0.00988		
10/08/01	1.150	1.650	0.82650	0.01081		
JKG	1.270	1.850	0.82026	0.00457		
10-s	0.310	0.430	0.84059	0.01249	**0.82809**	0.00625
Pass	0.870	1.250	0.82592	0.00217		
12/10/01	1.100	1.600	0.82087	0.00723		
JKG	1.250	1.800	0.82500	0.00309		
11-s ✓	0.405	0.625	0.79694	0.00601	**0.80294**	0.00539
Pass	0.900	1.350	0.80833	0.00539		
10/10/01	1.300	2.000	0.79816	0.00478		
JKG	1.400	2.100	0.80833	0.00539		
14-s1 ✓	0.390	0.560	0.82618	0.00251	**0.82367**	0.00494
Pass	0.775	1.100	0.83098	0.00731		
10/10/01	1.250	1.850	0.81378	0.00989		
JKG	1.350	1.950	0.82373	0.00006		
14-S2	0.385	0.565	0.81722	0.00706	**0.81017**	0.00764
Pass	0.820	1.200	0.81837	0.00821		
10/09/01	1.200	1.830	0.80168	0.00849		
JKG	1.350	2.050	0.80339	0.00678		
WC 3-5	0.380	0.555	0.81918	0.00357	**0.81561**	0.00470
Pass	0.810	1.200	0.81337	0.00224		
10/08/01	1.210	1.750	0.82321	0.00760		
JKG	1.300	1.900	0.81890	0.00329		

Date: 02-Oct-01	Deviation	@60 F	7.8	Allowable Diff.	Pb=	29.60 in Hg	BPG
Next Calibration: 03-Oct-01	Limit	@212 F	10.1	Allowable Diff.	Ta=	60.0 oF	980324tc
24-Oct-01		@325 F	11.8	Allowable Diff.			

		Ambient			Boiling, Water			Boiling, Oil			Average
	Probe/ID	Standard, F	Measured, F	Difference %	Standard, F	Measured, F	Difference %	Standard, F	Measured, F	Difference %	Difference %
Probe	3-1	70.4	70.6	0.0%	212.2	212.2	0.0%	530.2	523.6	0.7%	0.2%
Probe	3-2	70.6	70.4	0.0%	212.2	212.2	0.0%	534.2	531.2	0.3%	0.1%
Probe	3-3										
Probe	wc3-4										
Probe	3-5	70.4	70.4	0.0%	211.6	212.2	-0.1%	527.4	522.8	0.5%	0.1%
Probe	3-6	70.2	70.0	0.0%	212.2	213.2	-0.1%	536.4	538.4	-0.2%	-0.1%
Probe	3-7	70.2	71.2	-0.2%	212.2	212.0	0.0%	532.0	529.0	0.3%	0.0%
Probe	3-8	57.8	56.8	0.2%	212.2	212.0	0.0%	584.0	578.0	0.6%	0.3%
Probe	4-1	70.8	70.8	0.0%	211.6	211.8	0.0%	546.0	548.0	-0.2%	-0.1%
Probe	4-2	70.6	70.8	0.0%	211.4	212.0	-0.1%	548.0	550.0	-0.2%	-0.1%
Probe	4-3	58.6	56.8	0.3%	211.4	212.2	-0.1%	574.0	574.0	0.0%	0.1%
Probe	4-4	58.4	56.2	0.4%	211.4	213.0	-0.2%	575.0	571.0	0.4%	0.2%
Probe	4-5	70.6	70.6	0.0%	211.4	211.6	0.0%	548.0	547.0	0.1%	0.0%
Probe	4-6	70.4	70.6	0.0%	211.4	212.0	-0.1%	545.0	540.0	0.5%	0.1%
Probe	4-7	70.6	71.4	-0.2%	211.6	212.0	-0.1%	543.0	537.0	0.6%	0.1%
Probe	5-2	58.8	56.2	0.5%	211.0	212.2	-0.2%	569.0	567.0	0.2%	0.2%
Probe	5-3	70.8	71.2	-0.1%	212.2	213.8	-0.2%	546.0	543.0	0.3%	0.0%
Probe	5-4	71.0	72.2	-0.2%	211.8	211.4	0.1%	543.0	539.0	0.4%	0.1%
Probe	5-5	70.8	71.2	-0.1%	212.4	211.8	0.1%	545.0	545.0	0.0%	0.0%
Probe	5-6	70.8	71.2	-0.1%	211.6	211.6	0.0%	546.0	548.0	-0.2%	-0.1%
Probe	5-7	70.8	71.4	-0.1%	211.8	211.6	0.0%	545.0	544.0	0.1%	0.0%
Probe	5-8	70.8	72.0	-0.2%	211.6	211.6	0.0%	542.0	543.0	-0.1%	-0.1%
Probe	5-9	70.4	71.4	-0.2%	211.8	212.4	-0.1%	542.0	543.0	-0.1%	-0.1%
Probe	7-1	71.4	71.8	-0.1%	212.0	211.6	0.1%	533.0	530.0	0.3%	0.1%
Probe	7-2	71.4	73.4	-0.4%	211.8	211.8	0.0%	543.0	540.0	0.3%	-0.0%
Probe	7-3	71.2	72.8	-0.3%	211.4	213.0	-0.2%	538.0	538.0	0.0%	-0.2%
Probe	7-4	71.4	71.8	-0.1%	212.0	212.0	0.0%	543.0	544.0	-0.1%	-0.1%
Probe	7-5	71.4	75.0	-0.7%	212.2	212.2	0.0%	543.0	540.0	0.3%	-0.1%
Probe	7-6	71.6	72.4	-0.2%	211.2	213.0	-0.3%	544.0	544.0	0.0%	-0.2%
Probe	9-1	70.6	71.8	-0.2%	211.2	212.2	-0.1%	533.0	534.0	-0.1%	-0.1%
Probe	10-1	71.6	71.6	0.0%	212.0	212.6	-0.1%	532.0	533.0	-0.1%	-0.1%
Probe	10-2	71.6	72.2	-0.1%	211.2	212.6	-0.2%	545.0	542.0	0.3%	0.0%
Probe	10-3	71.4	71.4	0.0%	211.2	212.8	-0.2%	549.0	546.0	0.3%	0.0%
FS Pitot	10-S			0.0%			0.0%			0.0%	0.0%
FS Pitot	11-S	75.0	75.4	-0.1%	211.0	211.2	0.0%	542.0	541.0	0.1%	0.0%
	14-S	75.4	75.2	0.0%	211.0	213.6	-0.4%	510.0	511.0	-0.1%	-0.2%
	14-2	75.8	75.8	0.0%	211.2	211.4	0.0%	525.0	523.0	0.2%	0.1%
	A1										
	A2			0.0%			0.0%			0.0%	0.0%
	A3	62.8	62.4	0.1%	211.6	214.0	-0.4%	337.8	349.0	-1.4%	-0.6%
	A4	63.0	63.4	-0.1%	211.4	211.0	0.1%	353.0	354.0	-0.1%	-0.0%
	A5			0.0%			0.0%			0.0%	0.0%
	A6	63.0	63.8	-0.2%	211.8	210.2	0.2%	353.0	349.0	0.5%	0.2%
	F3	72.4	70.8	0.3%	212.2	209.4	0.4%	563.2	560.6	0.3%	0.3%
	F4	73.2	71.4	0.3%	211.6	211.2	0.1%	538.2	539.2	-0.1%	0.1%
	F5			0.0%			0.0%			0.0%	0.0%
	F6	70.8	71.4	-0.1%	211.8	210.8	0.1%	525.0	525.8	-0.1%	-0.0%
	F9	63.0	63.2	0.0%	211.6	214.0	-0.4%	345.6	342.0	0.4%	0.0%
	F11	62.6	65.2	-0.5%	212.2	214.2	-0.3%	355.2	357.2	-0.2%	-0.3%
	F14	73.0	71.8	0.2%	211.8	211.8	0.0%	551.2	549.6	0.2%	0.1%
	F12	71.0	71.6	-0.1%	212.0	213.0	-0.1%	547.6	546.2	0.1%	-0.0%
	F13	72.8	72.0	0.2%	211.8	213.4	-0.2%	584.2	583.4	0.1%	0.0%
	F73	70.8	70.4	0.1%	211.6	212.4	-0.1%	550.4	550.2	0.0%	0.0%
	F23	62.8	63.2	-0.1%	211.8	212.8	-0.1%	360.0	355.0	0.6%	0.1%
	F51										
	F84	62.8	63.2	-0.1%	211.4	214.0	-0.4%	353.0	345.8	0.9%	0.1%
	F81	72.0	71.4	0.1%	211.8	212.8	-0.1%	553.4	552.8	0.1%	0.0%
	F85	72.6	71.2	0.3%	212.0	213.2	-0.2%	386.0	392.0	-0.7%	-0.2%
	6S-2										
Probe											
Probe	w/c 4			0.0%			0.0%			0.0%	0.0%
	B1										
	B3			0.0%			0.0%			0.0%	0.0%
	B4	63.0	63.0	0.0%	211.6	216.0	-0.7%	357.2	356.0	0.1%	-0.2%
	B7	70.4	71.6	-0.2%	211.0	211.0	0.0%	473.4	475.0	-0.2%	-0.1%
	B10			0.0%			0.0%			0.0%	0.0%
	B11	71.0	71.4	-0.1%	212.2	210.6	0.2%	473.0	480.0	-0.8%	-0.2%
	B15	73.2	71.2	0.4%	212.0	211.8	0.0%	389.0	383.0	0.7%	0.4%
	B16	73.0	71.6	0.3%	212.0	211.6	0.1%	576.0	564.8	1.1%	0.5%
	B17	70.8	71.4	-0.1%	212.0	211.8	0.0%	552.0	550.0	0.2%	0.0%
AVERAGE		69.2	69.4	0.0%	211.7	212.3	-0.1%	510.2	509.3	0.1%	-0.0%

Thermocouple Indicator Calibration

Date: 02/20/01		Deviation	@32 F	7.4	Pb=	30.05 in Hg		TJH / MJE/DLR			
Next Calibration: 06-01		Limit	@212 F	10.1	Ta=	55.0 oF		TCINDm00.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	139.0	139.6	-0.1	602.0	604.0	-0.2	1255.0	1253.6	0.1	-0.07
	2	158.0	154.0	0.7	591.0	587.4	0.3	1280.0	1295.6	-0.9	0.04
	3	107.0	104.0	0.5	523.0	517.0	0.6	1307.0	1307.2	-0.0	0.38
	4	113.0	100.0	2.3	525.0	524.4	0.1	1353.0	1354.8	-0.1	0.76
	5	126.0	116.2	1.7	524.0	521.2	0.3	1271.0	1270.4	0.0	0.67
	6	116.0	117.0	-0.2	523.0	527.4	-0.4	1279.0	1271.6	0.4	-0.06
	7	144.0	153.2	-1.5	743.0	752.0	-0.7	1388.0	1369.2	1.0	-0.41
	8	132.0	135.0	-0.5	532.0	533.6	-0.2	1281.0	1296.8	-0.9	-0.52
	9	113.0	108.8	0.7	560.0	560.2	-0.0	1264.0	1277.0	-0.7	-0.01
	10	114.0	111.4	0.5	513.0	527.0	-1.4	1328.0	1316.4	0.7	-0.10
Omega trendicator	1	94.0	90.6	0.6	510.0	509.2	0.1	1215.0	1214.4	0.0	0.25
	2	102.0	101.4	0.1	520.0	519.0	0.1	1215.0	1214.8	0.0	0.07
	3	103.0	102.0	0.2	546.0	547.0	-0.1	1213.0	1215.0	-0.1	-0.01
	4	101.0	100.4	0.1	498.0	500.0	-0.2	1213.0	1215.0	-0.1	-0.07
	5	101.0	99.8	0.2	537.0	538.0	-0.1	1213.0	1213.8	-0.0	0.02
Fluke 6393007		60.8	61.6	-0.2	428.6	428.0	0.1	1208.8	1209.4	-0.0	-0.04
Fluke 7029062		22.6	21.0	0.3	453.8	452.0	0.2	1211.0	1209.2	0.1	0.21
Fluke 72760077	1			0.0			0.0			0.0	0.00
	2			0.0			0.0			0.0	0.00
Meter Box 4	1	84.0	84.6	-0.1	508	509.2	-0.1	1175	1176.6	-0.1	-0.11
	2	93.0	95.2	-0.4	512	512.8	-0.1	1183	1184.6	-0.1	-0.19
	3	93.0	94.0	-0.2	514.0	515.4	-0.1	1196.0	1197.0	-0.1	-0.13
	4	82.0	82.8	-0.1	517.0	518.4	-0.1	1189.0	1190.0	-0.1	-0.12
	5	82.0	82.2	-0.0	510.0	511.4	-0.1	1178.0	1179.8	-0.1	-0.10
Meter Box 5	1	109.0	108.4	0.1	538.0	540.2	-0.2	1241.0	1240.8	0.0	-0.03
	2	104.0	113.0	-1.6	494.0	498.0	-0.4	1405.0	1406.6	-0.1	-0.69
	3	138.0	142.2	-0.7	530.0	532.4	-0.2	1077.0	1081.0	-0.3	-0.40
	4	104.0	107.4	-0.6	516.0	516.6	-0.1	1125.0	1124.4	0.0	-0.21
	5	-	-	0.0	-	-	0.0	-	-	0.0	0.00
Meter Box 6	1	105.0	104.6	0.1	506.0	506.0	0.0	1212.0	1212.6	-0.0	0.01
	2	107.0	105.8	0.2	507.0	505.4	0.2	1212.0	1211.0	0.1	0.15
	3	105.0	103.0	0.4	503.0	501.6	0.1	1212.0	1211.8	0.0	0.17
	4	105.0	102.8	0.4	502.0	501.0	0.1	1212.0	1211.4	0.0	0.18
	5	105.0	104.0	0.2	503.0	501.0	0.2	1212.0	1211.2	0.0	0.14
Meter Box 7	1	102.0	101.6	0.1	506.0	504.6	0.1	1215.0	1215.2	-0.0	0.07
	2	112.0	111.2	0.1	503.0	502.2	0.1	1214.0	1212.8	0.1	0.10
	3	103.0	101.0	0.4	510.0	509.4	0.1	1217.0	1216.2	0.0	0.16
	4	103.0	101.4	0.3	510.0	508.8	0.1	1218.0	1217.6	0.0	0.14
	5	104.0	102.4	0.3	510.0	508.4	0.2	1218.0	1217.2	0.0	0.17
Meter Box 8	1	103.0	102.0	0.2	523.0	521.8	0.1	1222.0	1220.2	0.1	0.14
	2	104.0	101.8	0.4	526.0	524.6	0.1	1219.0	1217.8	0.1	0.20
	3	102.0	102.4	-0.1	506.0	505.0	0.1	1220.0	1218.0	0.1	0.05
	4	112.0	110.8	0.2	513.0	511.0	0.2	1220.0	1218.4	0.1	0.17
	5	112.0	110.6	0.2	518.0	516.6	0.1	1220.0	1218.6	0.1	0.16
Meter Box 9	1	100.0	101.6	-0.3	507.0	503.0	0.4	1259.0	1260.0	-0.1	0.02
	2	100.0	97.2	0.5	498.0	497.2	0.1	1270.0	1267.6	0.1	0.24
	3	101.0	96.8	0.8	511.0	509.0	0.2	1300.0	1300.0	0.0	0.32
	4	150.0	156.4	-1.0	515.0	517.0	-0.2	1321.0	1321.4	-0.0	-0.42
	5	123.0	126.6	-0.6	506.0	501.6	0.5	1281.0	1281.6	-0.0	-0.06
temp. control box 1	1	80.6	81.0	-0.1	226.8	227.8	-0.1	1216.0	1216.2	-0.0	-0.08
	2	98.0	99.0	-0.2	532.3	533.0	-0.1	1233.0	1233.2	-0.0	-0.09
	3	59.7	60.0	-0.1	495.4	494.8	0.1	1252.0	1251.6	0.0	0.01
	4	91.1	92.0	-0.2	521.2	521.4	-0.0	1216.0	1216.0	0.0	-0.06
	5	78.2	78.8	-0.1	504.2	504.6	-0.0	1216.0	1215.8	-0.0	-0.05
	6	76.9	77.8	-0.2	593.1	593.2	-0.0	1215.0	1215.2	0.1	-0.02
temp. control box 2	1	102.0	100.6	0.2	445.0	445.8	-0.1	1212.0	1209.8	0.1	0.10
	2	106.0	104.8	0.2	554.0	556.4	-0.2	1214.0	1214.2	-0.0	-0.01
	3	73.0	72.8	0.0	417.0	418.4	-0.2	1213.0	1212.4	0.0	-0.03
	4	72.0	70.8	0.2	522.0	524.4	-0.2	1210.0	1211.6	-0.1	-0.04
	5	84.0	84.2	-0.0	497.0	498.8	-0.2	1212.0	1212.0	0.0	-0.07
	6	83.0	83.6	-0.1	504.0	507.4	-0.4	1208.0	1209.6	-0.1	-0.19
Van II Heater Controls	1	108.0	119.6	-2.0	507.0	515.8	-0.9	1217.0	1212.8	0.3	-0.88
	2	122.0	124.6	-0.4	525.0	534.0	-0.9	1220.0	1209.6	0.6	-0.24
degrees C	3	130.0	131.2	-0.2	282.0	286.5	-0.8	659.0	656.3	0.2	-0.19
degrees C	4	77.0	78.6	-0.3	304.0	307.0	-0.4	708.0	704.7	0.3	-0.13
Van III Heater Control	1	101.0	108.4	-1.3	500.0	510.2	-1.1	1213.0	1208.0	0.3	-0.68
	2	98.0	102.8	-0.9	506.0	522.0	-1.6	1223.0	1218.6	0.3	-0.74
	3	107.0	109.4	-0.4	508.0	518.6	-1.1	1218.0	1219.2	-0.1	-0.53
	4	108.0	112.6	-0.8	515.0	524.2	-0.9	1223.0	1221.8	0.1	-0.56
AVERAGE		100.73	100.93	-0.03	498.66	500.02	-0.14	1197.55	1197.23	0.02	-0.05

[illegible]

110

Magnehelic Calibrations

Date	**07-feb-01**						**mgo20220**	File
Testers	**cdb**						**65.0**	Temp.(F)
Location	**Whitaker Shop**						**30.50**	Pb(in H2O)
							Dwyer/bx#1	Manometer
Magnehelic ID	15 sec. High	leak check Low	Scale Inches	Guage in H2O	Manometer in H2O	Difference in H2O	Difference %	**Difference Average**
SR#1	OK	OK	electronic	0.000	0.000	0.000	0.0%	
				1.000	1.000	0.000	0.0%	
				10.100	10.130	0.030	0.3%	
				28.200	28.150	-0.050	-0.2%	
				33.500	33.700	0.200	0.6%	**0.1%**
SR#2	OK	OK	electronic	0.000	0.000	-0.000	0.00%	
				1.000	1.039	0.039	3.75%	
				4.200	4.287	0.087	2.0%	
				22.500	22.640	0.140	0.62%	
				35.500	35.550	0.050	0.14%	**1.3%**
Dwyer #1	OK	OK	electronic	0.000	0.000	-0.000	0.00%	
				7.600	7.700	0.100	1.30%	
				15.000	15.020	0.020	0.1%	
				22.200	22.180	-0.020	-0.09%	
				35.500	35.640	0.140	0.39%	**0.3%**

Horizon Engineering 503/255-5050 Fax 503/255-0505

Magnehelic Calibrations

Date	10-Oct-01						08-Feb-1	File
Testers	PTH						85.0	Temp.(F)
Location	Whitaker Shop						30.50	Pb(in H2O)
							0-3Inc/MB-1	Manometer
Magnehelic ID	**15 sec. High**	**leak check Low**	**Scale Inches**	**Magnehelic in H2O**	**Manometer in H2O**	**Difference in H2O**	**Difference %**	**Difference Average**
1-A	OK	OK	1	0.000	0.000	0.000	0.0%	
				0.160	0.160	-0.020	-12.5%	
				0.320	0.320	0.000	0.0%	
				1.000	1.020	0.020	2.0%	**-2.6%**
1-C	n/a	n/a	1	0.000	0.000	0.000	0.0%	
21-sept-99				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	**ERR**
1-E	ok	ok	1	0.000	0.000	0.000	0.0%	
				0.080	0.080	0.000	0.0%	
				0.600	0.620	0.020	3.2%	
				0.800	0.800	0.000	0.0%	**0.8%**
1-F	OK	OK	1	0.000	0.000	0.000	0.0%	
				0.100	0.100	0.000	0.0%	
				0.400	0.400	0.000	0.0%	
				0.790	0.800	0.010	1.3%	**0.3%**
1-G	OK	OK	1	0.000	0.000	0.000	0.0%	
				0.200	0.200	0.000	0.0%	
				0.420	0.440	0.020	4.5%	
				0.840	0.880	0.040	4.5%	**2.3%**
1-H	n/a	n/a	1	0.000	0.000	0.000	0.0%	
02-Feb-00				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	**ERR**
1-I	n/a	n/a	1	0.000	0.000	0.000	0.0%	
21-sept-99				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	**ERR**
1-J	OK	OK	1	0.000	0.000	0.000	0.0%	
				0.250	0.240	-0.010	-4.2%	
				0.750	0.740	-0.010	-1.4%	
				1.000	1.040	0.040	3.8%	**-0.4%**
1-K	OK	OK	1	0.000	0.000	0.000	0.0%	
				0.360	0.360	0.000	0.0%	
				0.540	0.540	0.000	0.0%	
				0.940	0.930	-0.010	-1.1%	**-0.3%**
1-L	OK	OK	1	0.000	0.000	0.000	0.0%	
				0.200	0.200	0.000	0.0%	
				0.600	0.620	0.020	3.2%	
				0.980	1.020	0.040	3.9%	**1.8%**
2-A	n/a	n/a	2	0.000	0.000	0.000	0.0%	
02-Feb-00				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	**ERR**
2-B	OK	OK	2	0.000	0.000	0.000	0.0%	
02-Feb-00				0.250	0.240	-0.010	-4.2%	
				0.950	0.940	-0.010	-1.1%	
				1.900	1.900	0.000	0.0%	**-1.3%**
2-C	OK	OK	2	0.000	0.000	0.000	0.0%	
02-Feb-00				0.650	0.600	-0.050	-8.3%	
				1.500	1.500	0.000	0.0%	
				2.000	2.400	0.400	16.7%	**2.1%**
2-D	OK	OK	2	0.000	0.000	0.000	0.0%	
10-Feb-99				0.450	0.470	0.020	4.3%	
				1.050	1.000	-0.050	-5.0%	
				1.700	1.660	-0.040	-2.4%	**-0.8%**
2-E	n/a	n/a	2	0.000	0.000	0.000	0.0%	
02-Feb-00				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	**ERR**
3-A	OK	OK	3	0.000	0.000	0.000	0.0%	
				1.000	0.980	-0.020	-2.0%	
				1.500	1.520	0.020	1.3%	
				2.900	2.920	0.020	0.7%	**-0.0%**
3-H	n/a	n/a	3	0.000	0.000	0.000	0.0%	
10-Feb-99				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	
				0.000	0.000	0.000	ERR	**ERR**

HORIZON ENGINEERING LLC

13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 255-5050 • Fax (503) 255-0505
www.horizonengineering.com

February 8, 2001
Horizon Engineering shop
Barometer Calibration

The Barometric pressure reported at Portland Troutdale airport was 30.06" Hg as corrected to the altitude of the Horizon Engineering shop. The barometer reading in TVIII was 30.25"Hg. The barometer reading in TVII was 29.95" Hg. The barometer reading in TVI was 30.15" Hg. The FSL independent barometer was 30.29" Hg. All pressures are absolute, read at the Horizon Engineering shop.

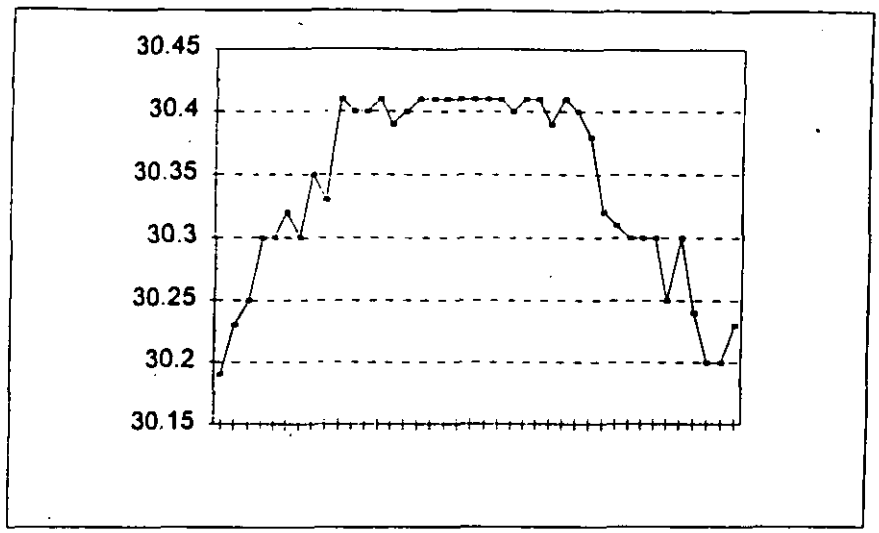
DLR

NOx Converter Efficiency Test 02/12/2001

Thermo Environmental Model 42H #2

Readings	Time
30.2	12:16
30.19	12:17
30.23	12:18
30.25	12:19
30.30	12;20
30.30	12:21
30.32	12:22
30.30	12:23
30.35	12:24
30.33	12:25
30.41	12:26
30.40	12:27
30.40	12:28
30.41	12:29
30.39	12:30
30.40	12:31
30.41	12:32
30.41	12:33
30.41	12:34
30.41	12:35
30.41	12:36
30.41	12:37
30.41	12:38
30.40	12:39
30.41	12:40
30.41	12:41
30.39	12:42
30.41	12:43
30.40	12:44
30.38	12:45
30.32	12:46
30.31	12:47
30.3	12:48
30.3	12:49
30.3	12:50
30.25	12:51
30.3	12:52
30.24	12:53
30.2	12:54

	Pretest	Post test
Zero	0.00	0.00
Span	100.00	100.00
Mid	n/a	n/a
Time	12:16	12:51



Percent Loss= **0.723**

PASS

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

E 36
P1 # 3073
9/25/00

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

HENG01
TO: DAVID ROSSMAN
HORIZON ENG'G/INFRARED NW
13585 NE WHITAKER WAY
PORTLAND OR 97230

DATE: September 21 2000

CUSTOMER ORDER NUMBER: 003070

COMPONENT	CONCENTRATION(v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO:	**CC53845**					
			VARIAN MODEL 1860 TCD		09/21/00	
Carbon Dioxide	✓21.83 ± 0.05 %	GMIS	S/N NONE	09/21/02	21.83 %	
		CYLINDER #:	THERMAL CONDUCTIVITY		21.83 %	
		CC122859	GAS CHROMATOGRAPHY		21.84 %	
		@ 17.93 %	LAST CAL DATE: 09/21/00	MEAN:	21.83 %	
			BOVAR MODEL 922M		09/13/00	09/20/00
Nitric Oxide	✓ 183.2 ± 0.9 ppm	GMIS	S/N VD92284844	09/20/02	183.3 ppm	183.1 ppm
NOx	183.2 ppm	CYLINDER #:	CONTINUOUS		182.9 ppm	183.5 ppm
		CC72078	UV PHOTOMETRY		183.0 ppm	183.3 ppm
		@ 258.5 ppm	LAST CAL DATE: 09/13/00	MEAN:	183.1 ppm	183.3 ppm
			CARLE INST MODEL 8000		09/05/00	09/14/00
Carbon Monoxide	✓ 880 ± 9 ppm	GMIS	S/N 8249	09/14/02	880 ppm	880 ppm
		CYLINDER #:	METHANATION/FID		880 ppm	879 ppm
		CC108729	GAS CHROMATOGRAPHY		881 ppm	881 ppm
		@ 1106 ppm	LAST CAL DATE: 08/15/00	MEAN:	880 ppm	880 ppm
			VARIAN MODEL 1860 FID		09/07/00	
Propane	86.7 ± 1.1 ppm	GMIS	S/N NONE	09/07/02	86.9 ppm	
		CYLINDER #:	FLAME IONIZATION		86.7 ppm	
O2-free Nitrogen	Balance	CC51261	GAS CHROMATOGRAPHY		86.6 ppm	
CYLINDER PRESSURE:	2000 psig	@ 104.1 ppm	LAST CAL DATE: 09/05/00	MEAN:	86.7 ppm	

ppm = µmole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R93/224, dated September 1993.
This cylinder should not be used if the pressure is less than 150 psig.

ANALYST: _____ APPROVED: _____
M.S.CALHOUN J.T.MARRIN

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.
STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

HENG01

TO:

David Rossman
Horizon Eng'g/Infrared NW
13585 NE Whitaker Way
Portland, OR 97230-

DATE : 06/07/01

CUSTOMER ORDER NUMBER: 003241

COMPONENT	CONCENTRATION(v/v) +/-EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CA04567					
			Varian Model 1868 #27		05/23/01	
Carbon dioxide	✓ 12.41 ±.02 %	GMIS	S/N None	05/23/03	12.39 %	
		Cylinder #	Thermal Conductivity		12.40 %	
		CC122859	Gas Chromatography		12.44 %	
		@ 17.93 %	Last Cal Date: 05/09/01		Mean: 12.41 %	
			Bovar West Res Model 922		05/15/01	05/23/01
Nitric oxide	✓ 89.8 ±1.2 ppm	GMIS	S/N VD92284841	05/23/03	89.6 ppm	89.6 ppm
NOx	89.8 ppm	Cylinder #	Continuous		89.7 ppm	89.5 ppm
		CA03023	UV Photometry		89.7 ppm	90.3 ppm
		@ 181.6 ppm	Last Cal Date: 05/02/01		Mean: 89.7 ppm	89.8 ppm
			Carle Instr Model 8000		05/15/01	06/07/01
Carbon monoxide	✓ 499 ±5 ppm	GMIS	S/N 8249	06/07/03	499 ppm	499 ppm
		Cylinder #	Methanation/FID		498 ppm	499 ppm
		CC278	Gas Chromatography		499 ppm	500 ppm
		@ 539 ppm	Last Cal Date: 06/06/01		Mean: 499 ppm	499 ppm
			Varian Model 1868		05/17/01	
Propane	50.2 ±.4 ppm	GMIS	S/N None	05/17/03	50.1 ppm	
		Cylinder #	Flame Ionization		50.2 ppm	
Nitrogen,O2-Free Balance		CC121986	Gas Chromatography		50.2 ppm	
Cylinder Pressure: 2000 psig		@ 50.6 ppm	Last Cal Date: 05/17/01		Mean: 50.2 ppm	

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
This cylinder should not be used if the pressure is less than 150 psig.

Analyst: _____ M.S. Calhoun

Approved: _____ J.T. Marrin

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

HENG01
TO:
David Rossman
Horizon Eng'g/Infrared NW
13585 Whitaker Way
Portland, OR 97230-

DATE : 06/07/01

CUSTOMER ORDER NUMBER: 003255

PAGE 1

COMPONENT	CONCENTRATION(v/v) +/-EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CA04488				
			Varian Model 1860		05/30/01
Oxygen	✓ 11.60 ±.13 %	GMIS	S/N None	05/30/04	11.62 %
		Cylinder #	Thermal Conductivity		11.58 %
Nitrogen	Balance	CC50175	Gas Chromatography		11.59 %
Cylinder Pressure: 2000 psig		@ 25.69 %	Last Cal Date: 05/24/01		Mean: 11.60 %

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
This cylinder should not be used if the pressure is less than 150 psig.

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

01-24-00

FAX

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

HENG01

TO:

DATE : 01/20/00

DAVID ROSSMAN
HORIZON ENGINEERING
13585 NE WHITAKER WAY
PORTLAND, OR 97230-

CUSTOMER ORDER NUMBER: 2809

PAGE 1

COMPONENT	CONCENTRATION(v/v) +/-EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CA03076					
			Monitor Labs Model 8440		01/04/00	01/11/00
Nitric oxide ✓	25.25 ±.25 ppm	GMIS	S/N 136	01/11/02	25.38 ppm	25.33 ppm
NOx	25.25 ppm	Cylinder #	Continuous		25.16 ppm	25.23 ppm
Nitrogen,O2-Free Balance		CC114778	Chemiluminescence		25.13 ppm	25.30 ppm
Cylinder Pressure: 2000 psig		@ 19.88 ppm	Last Cal Date: 01/10/00		Mean: 25.26 ppm	25.29 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.

This cylinder should not be used if the pressure is less than 150 psig.

Analyst: Steve Kozy
S.B. Kozy

Approved: J.T. Marrin

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

P22

HENG01
TO: David Rossman
Horizon Engineering / Infrared NW
13585 NE Whitaker Way
Portland OR 97230

DATE: October 3 2001

CUSTOMER ORDER NUMBER: 003351

COMPONENT	CONCENTRATION(v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO:	CA05171				
			VARIAN MODEL 1860 FID		10/01/01
Propane	✓ 89.0 ± 0.9 ppm	GMIS	S/N NONE	10/01/04	89.1 ppm
		CYLINDER #:	FLAME IONIZATION		89.0 ppm
Zero Air	Balance	CC51261	GAS CHROMATOGRAPHY		89.0 ppm
CYLINDER PRESSURE:	2000 psig	@ 104 ppm	LAST CAL DATE: 09/11/01	MEAN:	89.0 ppm

ppm = µmole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
This cylinder should not be used if the pressure is less than 150 psig.

ANALYST: _____ APPROVED: _____
M.S.CALHOUN J.T.MARRIN

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.
STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

P19

HENG01
TO: David Rossman
Horizon Engineering / Infrared NW
13585 NE Whitaker Way
Portland OR 97230

DATE: October 3 2001

CUSTOMER ORDER NUMBER: 003351

COMPONENT	CONCENTRATION(v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO:	CA05193				
			VARIAN MODEL 1860 FID		10/01/01
Propane	✓ 51.6 ± 0.5 ppm	GMIS	S/N NONE	10/01/04	51.4 ppm
		CYLINDER #:	FLAME IONIZATION		51.6 ppm
Ultrapure Air	Balance	CC121986	GAS CHROMATOGRAPHY		51.7 ppm
CYLINDER PRESSURE:	2000 psig	@ 50.6 ppm	LAST CAL DATE: 09/11/01	MEAN:	51.6 ppm

ppm = µmole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
This cylinder should not be used if the pressure is less than 150 psig.

ANALYST: _____ APPROVED: _____
M.S.CALHOUN J.T.MARRIN

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

For Technical Information Call
1-800-752-1597

R12

AIR PRODUCTS

Air Products and Chemicals, Inc. * 12722 S. Wentworth Avenue, Chicago, IL 60628

ISO CERTIFICATION: 9002

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS STANDARD

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS
1680 OAK TREE RD.
EDISON NJ 08820-

Order No: SRP-410911-04
Batch No: 861-67867
PO:
Release:

Cylinder No: SG9152832BAL
Bar Code No: DGY894
Cylinder Pressure*: 2000 psig
Certification Date: 03/27/2000
Expiration Date: 03/27/2003

CERTIFIED CONCENTRATION		REFERENCE STANDARDS			ANALYTICAL INSTRUMENTATION			
Component	Certified Concentration	Cylinder Number	Standard Type	Standard Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
CARBON MONOXIDE	✓85.9 ±0.57 PPM	SG9159515BAL	NTRM	99.90 PPM	HORIBA VIA-510	405079	03/15/00	NON DISPERSIVE INFRARED
NITROGEN	Balance Gas							

*** STANDARD SHOULD NOT BE USED BELOW 150 PSIG**

121

Analyst: HOLLY HATTENDORF

(16921)

Approved By: RICHARD FRY

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

P18

HENG01
TO: David Rossman
Horizon Engineering / Infrared NW
13585 NE Whitaker Way
Portland OR 97230

DATE: October 3 2001

CUSTOMER ORDER NUMBER: 003351

COMPONENT	CONCENTRATION(v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO:	CA05167				
			VARIAN MODEL 1860 FID		09/21/01
Propane	✓ 28.69 ± 0.28 ppm	GMIS	S/N NONE	09/21/04	28.62 ppm
		CYLINDER #:	FLAME IONIZATION		28.77 ppm
Ultrapure Air	Balance	CC121986	GAS CHROMATOGRAPHY		28.68 ppm
CYLINDER PRESSURE:	2000 psig	@ 50.6 ppm	LAST CAL DATE: 09/17/01	MEAN:	28.69 ppm

ppm = µmole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
This cylinder should not be used if the pressure is less than 150 psig.

ANALYST: _____ APPROVED: _____
M.S.CALHOUN J.T.MARRIN

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

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

01-25-99

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

P.12
PO2396 of 11-23-98

HENG01

TO:

DATE : 01/15/99

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

CUSTOMER ORDER NUMBER: 2396

PAGE 1

COMPONENT	CONCENTRATION(v/v) +/-EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CA03475				
			Varian Model 1860		01/14/99
Propane	✓8.61 ± .01 ppm	GMIS	S/N None	01/14/02	8.62 ppm
		Cylinder #	Flame Ionization		8.60 ppm
Ultrapure Air	Balance	CC659	Gas Chromatography		8.62 ppm
Cylinder Pressure: 2000 psig		@ 10.11 ppm	Last Cal Date: 01/14/99		Mean: 8.61 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R93/224, dated September 1993.
This cylinder should not be used if the pressure is less than 150 psig.

Analyst: _____ Approved: _____

M.S. Calhoun J.T. Marrin

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

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

S 3
P.O 3088
9.25/00

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

HENG01
TO: DAVID ROSSMAN
HORIZON ENG'G/INFRARED NW
13585 NE WHITAKER WAY
PORTLAND OR 97230

DATE: September 21 2000

CUSTOMER ORDER NUMBER: 003088

COMPONENT	CONCENTRATION(v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO:	CC49351					
			BOVAR MODEL 922M		09/12/00	09/21/00
Sulfur Dioxide ✓	26.47 ± 0.27 ppm	GMISR	S/N VD92284844	03/01/01	26.38 ppm	26.37 ppm
		CYLINDER #:	CONTINUOUS		26.48 ppm	26.47 ppm
Nitrogen	Balance	CC68759	UV PHOTOMETRY		26.56 ppm	26.55 ppm
CYLINDER PRESSURE:	2000 psig	@ 25.64 ppm	LAST CAL DATE: 09/08/00	MEAN:	26.47 ppm	26.46 ppm

ppm = µmole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol. Report Number EPA-600/R93/224, dated September 1993.
This cylinder should not be used if the pressure is less than 150 psig.

ANALYST: Mark Monson APPROVED:
M. J. MONSON J. T. MARRIN

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

HENGZI

TO:

DATE : 09/13/01

David Rossman
Horizon Eng'g / Infrared NW
13585 NE Whitaker Way
Portland, OR 97230-

CUSTOMER ORDER NUMBER: 003329

PAGE 1

COMPONENT	CONCENTRATION(v/v) +/-EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CC25763	S4				
			Bovar West Res Model 922		09/04/01	09/12/01
Sulfur dioxide	15.27 ±.16 ppm	GMIS	S/N 922M8379-1	03/12/02	15.23 ppm	15.14 ppm
		Cylinder #	Continuous		15.34 ppm	15.24 ppm
Nitrogen	Balance	CC28050	UV Photometry		15.38 ppm	15.26 ppm
Cylinder Pressure: 2002 psig		@ 26.72 ppm	Last Cal Date: 08/28/01		Mean: 15.32 ppm	15.21 ppm
CYLINDER NO.:	CC53849	S9				
			Bovar West Res Model 922		09/04/01	09/12/01
Sulfur dioxide	26.96 ±.29 ppm	GMIS	S/N 922M8379-1	03/12/02	26.78 ppm	26.90 ppm
		Cylinder #	Continuous		27.01 ppm	26.95 ppm
Nitrogen	Balance	CC28050	UV Photometry		27.07 ppm	27.05 ppm
Cylinder Pressure: 2000 psig		@ 26.72 ppm	Last Cal Date: 08/28/01		Mean: 26.95 ppm	26.97 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
This cylinder should not be used if the pressure is less than 150 psig.

Analyst: Mark Monson
M.J. Monson

Approved:
J.T. Marrin

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

Environmental Services Laboratory, Inc.

E S L

17400 SW Upper Boones Ferry Road, Suite 270 • Portland, OR 97224 • (503) 670-8520

December 07, 2001

Nichole Karl
Horizon Engineering
13585 NE Whitaker Way
Portland, OR 97230
TEL: (503) 255-5050
FAX (503) 255-0505

RE: 1685 Audit / OSM Audit Samples Order No.: 0111194

Dear Nichole Karl,

Environmental Services Laboratory received 5 samples on 11/26/01 for the analyses presented in the following report.

The Samples were analyzed for the following tests:
ICP Metals (EPA 6010B)

There were no analytical problems encountered, and all data met laboratory QC criteria, unless noted in a Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval of the Laboratory.
The following checked data sections are included in this report, and numbered to indicate total pages within each report section.

✓Base Sample Report ✓Method Blank Report __Sample Duplicate Report
__Matrix Spike/Matrix Spike Duplicate Report ✓Laboratory Control Spike/Spike Duplicate Report __Continuing Calibration Verification Report ✓Initial Calibration Verification Report

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Leslie Rush
Project Manager

Keith Hunter
Technical Review

Method 12 Compliance Audit Material
(Lead Spiked Aqueous Solution)

REPORTING FORM: To be completed by laboratory

Request Number/Sample Number: M29-0482-01 / AMH2-123 Date Issued: 11/09/01

Concentration Level: High

Auditee:

Company: 0

Address: 0

Attention of: 0 Phone: -

Requestor:

Agency: OR DEQ / NW Region

Address: 2020 SW 4th Ave, Suite 400, Portland, OR 97230

Attention of: Jack Herbert Phone: (503) 229-5579

Project Name: Oregon Steel Mills

Audit Results (Results in µg/mL)

Compound	Result
Lead	49.7

Method 12 Compliance Audit Material
(Lead Spiked Aqueous Solution)

REPORTING FORM: To be completed by laboratory

Request Number/Sample Number: M29-0482-02 / AMM2-122 Date Issued: 11/09/01

Concentration Level: Medium

Auditee:

Company: 0

Address: 0

Attention of: 0 Phone:

Requestor:

Agency: OR DEQ / NW Region

Address: 2020 SW 4th Ave, Suite 400, Portland, OR 97230

Attention of: Jack Herbert Phone: (503) 229-5579

Project Name: Oregon Steel Mills

Audit Results (Results in µg/mL)

Compound	Result
Lead	5.93

Method 12 Compliance Audit Material
(Lead Spiked Filter)

REPORTING FORM: To be completed by laboratory

Request Number/Sample Number: M29-0480-01 / FMH1-109 Date Issued: 11/09/01

Concentration Level: High

Auditee:

Company: 0

Address: 0

Attention of: 0 Phone:

Requestor:

Agency: OR DEQ / NW Region

Address: 2020 SW 4th Ave, Suite 400, Portland, OR 97230

Attention of: Jack Herbert Phone: (503) 229-5579

Project Name: Oregon Steel Mills

Audit Results (Results in µg)

Compound	Result
Lead	888

Method 12 Compliance Audit Material
(Lead Spiked Filter)

REPORTING FORM: To be completed by laboratory

Request Number/Sample Number: M29-0480-02 / Fil-1590 Date Issued: 11/09/01

Concentration Level: Medium

Auditee:

Company: 0

Address: 0

Attention of: 0 Phone: -

Requestor:

Agency: OR DEQ / NW Region

Address: 2020 SW 4th Ave, Suite 400, Portland, OR 97230

Attention of: Jack Herbert Phone: (503) 229-5579

Project Name: Oregon Steel Mills

Audit Results (Results in µg)

Compound	Result
Lead	104

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	AMH2-123
Lab Order:	0111194	**Tag Number:**	
Project:	1685 Audit / OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111194-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	49.7	0.00500		ug/ml	1	12/4/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	AMM2-122
Lab Order:	0111194	**Tag Number:**	
Project:	1685 Audit / OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111194-02A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	5.93	0.00500		ug/ml	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	FMH1-109
Lab Order:	0111194	**Tag Number:**	
Project:	1685 Audit / OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111194-03A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	888	0.500		ug	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

133

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	FIL-1590
Lab Order:	0111194	**Tag Number:**	
Project:	1685 Audit / OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111194-04A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	104	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

Date: *07-Dec-01*

CLIENT:	Horizon Engineering	**Client Sample ID:**	BLANK
Lab Order:	0111194	**Tag Number:**	
Project:	1685 Audit / OSM Audit Samples	**Collection Date:**	11/21/01
Lab ID:	0111194-05A	**Matrix:**	FILTER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: lmr
Lead	0.540	0.500		ug	1	12/3/01

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Environmental Services Laboratory

CLIENT: Horizon Engineering
Work Order: 0111194
Project: 1685 Audit / OSM Audit Samples

Date: 07-Dec-01

QC SUMMARY REPORT

Method Blank

Sample ID: MB-3578	Batch ID: 3578	Test Code: EPA 6010B	Units: mg/Kg	Analysis Date: 12/3/01				Prep Date: 11/30/01		
Client ID:	0111194	Run ID: ICP_011203A		SeqNo: 98967						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1									

Sample ID: MB-3579	Batch ID: 3579	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/4/01				Prep Date: 11/30/01		
Client ID:	0111194	Run ID: ICP_011204B		SeqNo: 98951						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.005									

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

CLIENT: Horizon Engineering
Work Order: 0111194
Project: 1685 Audit / OSM Audit Samples

Date: 07-Dec-01

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS-3578	Batch ID: 3578	Test Code: EPA 6010B	Units: mg/Kg		Analysis Date: 12/3/01		Prep Date: 11/30/01				
Client ID:	0111194	Run ID: ICP_011203A			SeqNo: 98968						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	49.4	1	50	0	98.8%	80	120	0			

Sample ID: LCS-3579	Batch ID: 3579	Test Code: EPA 6010B	Units: mg/L		Analysis Date: 12/4/01		Prep Date: 11/30/01				
Client ID:	0111194	Run ID: ICP_011204B			SeqNo: 98952						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	.494	0.005	0.5	0	98.8%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

CLIENT: Horizon Engineering
Work Order: 0111194
Project: 1685 Audit / OSM Audit Samples

Date: 07-Dec-01

QC SUMMARY REPORT

Minerals ICV for ICP

Sample ID: ICVHI	Batch ID: 3578	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/3/01				Prep Date: 11/30/01		
Client ID: 0111194	Run ID: ICP_011203A			SeqNo: 98966						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.98	0.005	10	0	99.8%	90	110	0			

Sample ID: ICVLOW	Batch ID: 3578	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/3/01				Prep Date: 11/30/01		
Client ID: 0111194	Run ID: ICP_011203A			SeqNo: 98965						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	.513	0.005	0.5	0	102.6%	90	110	0			

Sample ID: ICVHI	Batch ID: 3579	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/4/01				Prep Date: 11/30/01		
Client ID: 0111194	Run ID: ICP_011204B			SeqNo: 98950						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.79	0.005	10	0	97.9%	90	110	0			

Sample ID: ICVLOW	Batch ID: 3579	Test Code: EPA 6010B	Units: mg/L	Analysis Date: 12/4/01				Prep Date: 11/30/01		
Client ID: 0111194	Run ID: ICP_011204B			SeqNo: 98949						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	.504	0.005	0.5	0	100.8%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

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

CHAIN OF CUSTODY REPORT

Work Order # 01119

REPORT TO: Horizon Engineering
ATTENTION: Nichole Karl
ADDRESS: 13585 NE Whitaker Way
Portland, OR 97230
PHONE: 503-255-5050 FAX: 503-255-0505
PROJECT NAME: OSM Audit Samples
PROJECT NUMBER: 1685 Audit
SAMPLED BY: Mike Eisele

INVOICE TO: SAME
ATTENTION: Penny Hossman
ADDRESS: Same
P.O. NUMBER:
QUOTE #:

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: (X) Standard | 7 | 5 | 4 | 3 | 2 | 1 | Same Day
Fuels & Hydrocarbon Analyses: 5 Standard | 3-4 | 2 | 1 | Same Day
OTHER Specify
* Turnaround Requests less than standard may incur Rush Charges.

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	Analysis Request: lead	MATRIX (W, S, A, O)	# OF CONTAINERS	COMMENTS
1 AMH2-123 (AQ)		X			
2 AMM2-122 (AQ)		X			
3 FMH1-109 (filter)		X			
4 Fil-1590 (filter)		X			
5 Blank (filter)		X			
6					
7					
8					
9					
10					

RELINQUISHED BY: Nichole Karl — DATE: — TIME:
PRINT NAME: Nichole Karl — FIRM: H.E.
RECEIVED BY: [signature] — DATE: 11/21/0
PRINT NAME: S. MACLEOD — FIRM: ESL — TIME: 1300

RELINQUISHED BY: — DATE: — TIME:
PRINT NAME: — FIRM:
RECEIVED BY: — DATE: — TIME:
PRINT NAME: — FIRM:

ADDITIONAL REMARKS: Please analyze these same time as OSM1685 Audit samples. Please follow instructions provided & fill out reporting form also. Similar to previous ESL job # 0101063, Please call if there are questions.

PAGE 1 OF 1

Dave Rossman

From: HERBERT.Jack@deq.state.or.us
Sent: Monday, December 17, 2001 6:47 PM
To: info@horizonengineering.com; drossman@horizonengineering.com
Subject: Attn Michelle: Thank you for the info for the Or Steel audit samples. Audit passed.

The lab passed the audit according to the EPA's database response.

Jack Herbert
Source Test Coordinator
Oregon Department of Environmental Quality, Northwest Region
(503)229-5579
(503)229-5265 fax
herbert.jack@deq.state.or.us

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QA/QC Documentation

Introduction The QA procedures outlined in the U. S. Environmental Protection Agency (EPA) test methods are followed, including procedures, equipment specifications, calibrations, sample extraction and handling, calculations, and performance tolerances. Many of the checks performed have been cited in the Sampling section of the report text. The results of those checks are on the applicable field data sheets in the Appendix.

Continuous Analyzer Methods Field crews operate the continuous analyzers according to the test method requirements, and Horizon's additional specifications. On site quality control procedures include:

- calibrations with EPA Protocol 1 gases or NIST traceable gases
- pre-test zero and span checks and linearity test
- bias checks (introducing calibration gas as near to the probe tip as possible)
- calibration error (linearity) checks if any analyzer adjustments are made
- leak checks on the gas sampling system
- correction of problems that show up as the results of checks
- strip chart recordings for backup to the electronic data acquisition system

Manual Equipment QC Procedures On site quality control procedures include pre- and post-test leak checks on trains and pitot systems. If pre-test checks indicate problems, the system is fixed and rechecked before starting testing. If post-test leak checks are not acceptable, the test run is voided and the run is repeated. Thermocouples and readouts are verified in the field to read ambient prior to the start of any heating or cooling devices. Nozzles are checked for nicks or dents and are measured on three diameters twice each year.

Sample Handling Samples taken during testing are handled to prevent contamination from other runs and ambient conditions. Sample containers are glass, Teflon™, or polystyrene (filter petri dishes) and are pre-cleaned by the laboratory and in the Horizon Engineering shop. Sample levels are marked on containers and are verified by the laboratory. All particulate sample containers are kept upright and are delivered to the laboratory by Horizon personnel.

Data Processing Personnel performing data processing double-check that data entry and calculations are correct. Results include corrections for field blanks and analyzer drift. Any abnormal values are verified with testing personnel and the laboratory, if necessary.

After results are obtained, the data processing supervisor validates the data with the following actions:

- verify data entry
- check for variability within replicate runs
- account for variability that is not within performance goals (check the method, testing, and operation of the plant)
- verify field quality checks

Equipment Calibrations Periodic calibrations are performed on each piece of measurement equipment according to manufacturers' specifications and applicable test method requirements. The Oregon Department of Environmental Quality (ODEQ) Source Testing Calibration Requirements sheet is used as a guideline. Calibrations are performed using primary standard references and calibration curves where applicable.

Thermocouples Thermocouples are calibration checked against an NIST traceable thermocouple and indicator system every six months at three points. Thermocouple indicators and temperature controllers are checked using a NIST traceable signal generator. Readouts are checked over their usable range and are adjusted if necessary (which is very unusual).

Pitots Every six months, S-type pitots are checked for misalignment, angles, lengths, and proximity to thermocouples. They are then calibrated in a wind tunnel at four points against a standard pitot using inclined manometers. They are examined for dents or distortion before each test. Pitots are protected with covers during storage and handling until they are ready to be inserted in the sample ports.

Dry Gas Meters Dry gas meters used in the manual sampling trains are calibrated at five rates using a standard dry gas meter that is never taken into the field. The standard meter is calibration verified by the Northwest Natural Gas meter shop once every year. Dry gas meters are post-test calibrated with documentation provided in test reports.

High Volume Sampler Orifice The orifice for the High Volume sampler is calibrated annually against a positive displacement (Roots type) flow meter, two or more trials at six flow rates. The Roots meter came with a manufacturer's calibration curve and has been calibration checked by the Northwest Natural Gas meter shop.

Correspondence

Source Test Plan and Correspondence

TO: Debbie Silva

DEPT:

CO: OSM

FAX: 503-240-5775

HP FAX

FROM: Nichole Karl

DATE: 10/16/01

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HORIZON ENGINEERING LLC

13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 255-5050 • Fax (503) 255-0505
www.horizonengineering.com

FAXED 10/16/01

October 15, 2001

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

Re: Source Testing: Oregon Steel Mills
14400 N Rivergate Boulevard
Portland, Oregon 97203

This correspondence is notice that Horizon Engineering is to do source testing for the above-referenced facility, scheduled for November 5 through 8, 2001. This will serve as the Source Test Plan unless changes are requested prior to the start of testing.

1. **Source(s) to be Tested:** ICA Baghouse (EAF) System and Reheat Furnace.

2. **Purpose of the Testing:** Compliance with Title V Permit No. 26-1865 conditions 37,38, and 39.

3. **Source Description:** 16-compartment baghouse controlling particulate emissions from the EAF.

4. **Pollutants to be Tested:** Particulate, CO, NO_x, SO_2, VOC, Lead and Opacity.

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, 1999; and Oregon Department of Environmental Quality (ODEQ) methods in Source Sampling Manual Volume 1, January 1992.

Source: ICA Baghouse (EAF system)

Inlet tests:

Flow Rate:	EPA Methods 1 and 2 (at BH inlet, twice on test day)
CO_2 and O_2:	EPA Method 3A (NDIR and paramagnetic analyzers)
Moisture:	ODEQ Method 4 (wet bulb and dry bulb temperatures, inlet)
SO_2:	EPA Method 6C (non-dispersive ultraviolet analyzer)
NO_X:	EPA Method 7E (chemiluminescent analyzer)
CO:	EPA Method 10 (gas filter correlation analyzer)
VOC:	EPA Method 25A, (heated sample line and two analyzers, one with simultaneous VOC "cutter" for back-out of CH_4 content)

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Outlet tests:

Flow Rate:	EPA Methods 1 and 2 (at each compartment, as done in past)
Particulate:	ODEQ Method 8 (High Volume sampler)
Lead:	Analysis of M-8 catch, with audit sample analysis (3 expected)
Opacity:	EPA Method 9 (six minutes per test)

Source: Reheat Furnace

Flow Rate:	EPA Methods 1 and 2 (traversing)
Flow Rate:	EPA Method 19 (gas fuel meter and O_2 in exhaust)
CO_2 and O_2:	EPA Method 3A (NDIR and paramagnetic analyzers)
Moisture:	EPA Method 4 (impinger train, traversing)
NO_X:	EPA Method 7E (chemiluminescent analyzer)
CO:	EPA Method 10 (gas filter correlation analyzer)
VOC:	EPA Method 25A, (heated sample line and two analyzers, one with simultaneous VOC "cutter" for back-out of CH_4 content)

6. **Continuous Analyzer Data Recording:** Data acquisition system (DAS) with strip chart records as backup. Either 10-second data points or one-minute averages of one-second readings are logged. Run averages, the graphic outputs from the DAS, annotated strip charts, and a few minutes of manually recorded data will be included in the test reports.

7. **Continuous Analyzer Gas Sampling:** Fixed point in the baghouse inlet. Reheat gas sampling probes will be traversed with the moisture probe.

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:
   - daily calibration (zero and span) and calibration error (linearity) checks
   - pre- and post-test zero bias and span bias checks
   - checks performed with EPA Protocol 1 or NIST traceable gases
   - data acquisition systems record 10-second data points or one-minute averages of one second readings
   - strip chart recordings
   - manual readings for a few minutes

   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.

Laboratory QC Procedures: EPA audit samples for lead will be analyzed with the field samples if they are provided by ODEQ prior to when samples are submitted to the laboratories. The laboratory will perform normal laboratory QC procedures. The laboratory will follow EPA Method 12 with special attention to sections 11.2.1: digestion of complete filter, 11.2.4 and 11.2.5: field blanks, one solvent and two filters, 11.4.1: sample concentrations brought into the linear analytical range, and 11.5: a single spike, method-of-standard-additions recovery check. Also the particulate filter tare weights will be weighed to a constant weight and the records submitted with the final report.

9. **Number of Sampling Replicates and their Duration:** Three test runs of at least two heats each are to be made on the baghouse. Three test runs of at least one hour each are to be made on the reheat furnace exhaust. In no case will sampling replicates be separated by twenty-four (24) or more hours unless prior authorization is granted by the Department.

10. **Reporting Units for Results:** Particulate – gr/dscf, lb/hr, and lb/ton cold charge. Gases – ppmv, lb/hr, and lb/ton cold charge.

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

12. **Source Site Personnel:** Debbie Deetz Silva
(503) 978-6044
Fax (503) 240-5775

13. **Regulatory Contacts:** Jack Herbert
(503) 229-5579
Fax (503) 229-5265

14. **Applicable Process/Production Information:** Process operating data and production information that characterizes the source operation is considered to be: Heat charge weights and materials, tap weights and materials, heat times. Process information is normally gathered by the Source-site personnel and provided to Horizon for inclusion in the report.

Reheat: Gas use - Time/wt. of slabs in

The sources must operate at normal maximum rates or other rates that may be specified in the Title V Permit. Rates not in agreement with those stipulated in the Permit can result in test rejection for application to determine compliance or emission factor verification. Imposed process limitations could also result from atypical rates.

15. **Control Device Operating Parameters:** Baghouse pressure drops.

16. **Opacity Readings to be Taken By:** Horizon Engineering

17. **Certified Plume Evaluator:** Yes (x) No ( ) N/A ( )

18. **Other Considerations,** including sampling site configurations, equipment limitations, special methods, etc.:

    Particulate: Each Oregon Method 8 test shall encompass two complete heat cycles with samples collected for 5 minutes from as many as possible of the 16 compartments. The next test shall begin in the next compartment after the final compartment sampled in the previous test. Particulate is to be sampled in the gas stream above the bags in the slot shaped area where gas flows up and toward the center of the baghouse. This allows the sampler nozzle to be inserted through ports in the ceiling of the breezeway at the top of the baghouse. As in the past, sampling will be isokinetic at a single point at the outlet of each compartment.

    Flow Rate Measurements: Velocities will be measured at five points through each port, giving 5 velocities per compartment, 80 points for the baghouse. Velocity pressure determinations will be by use of an S-type pitot and a micro-manometer. Past testing has shown that traversing this single port adequately characterizes the outlet flow rate.

    Gaseous Pollutant Measurements: Gas analyzer readings at the baghouse inlet will be continuous through all of the M-8 tests with calibrations only at the beginning and end of the test day. Instrument drift may exceed normal run allowances for the entire period. Instrument results will be corrected for drift.

    Timing: The testers will synchronize their watches to record times in sync with the OSM heat log in the arc furnace control pulpit.

19. **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 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 field work, unless another deadline has been stipulated. Oregon Steel Mills will send two (2) copies of the completed Source Test Report to you at the address above.

Any questions or comments relating to this test plan should be directed to me.

Sincerely,

David Rossman

David R. Rossman, P. E.

cc: Debbie Deetz Silva, Oregon Steel Mills

TO: Debbie Silva

DEPT:

CO: OSM

FAX: 503-240-5775

HP FAX

FROM: Nichole Karl

DATE: 11/5/01

HORIZON ENGINEERING LLC

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

November 5, 2001

Mr. Jack Herbert
Oregon Department of Environmental Quality
Northwestern Region – Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Dear Mr. Herbert,

This correspondence is to notify you that the Source Testing for the Reheat Furnace at Oregon Steel Mills has been postponed due to technical difficulties. Testing on the Baghouse will be as scheduled with set-up on Tuesday, November 6 and testing on Wednesday, November 7th. Testing on the Reheat Furnace scheduled for November 8, will now take place on a date yet to be determined. ODEQ will be notified once the testing has been rescheduled. If you have any questions or concerns about these arrangements please feel free to call me. Thank you for your time.

Sincerely,

Nichole Karl

Nichole Karl,
Project Coordinator

cc: Debbie Dietz Silva, Oregon Steel Mills

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

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

November 6, 2001

Oregon Steel Mills, Inc
Attn: Debbie Deetz Silva
PO Box 2760
Portland, Oregon 97208

11-09-01

Horizon Engineering
Attn: David R Rossman and C David Bagwell
13585 NE Whitaker Way
Portland, Oregon 97230

Re: AQ Multnomah County
Title V Permit No 26-1865
Oregon Steel Mills
Source-test plan for electric-arc and ladle-metallurgy furnaces' annual baghouse test for emission-factor verification and PM and SO_2 concentrations' compliance

Dear Ms Silva and Messrs Rossman and Bagwell:

On October 16, 2001, I received your test plan for Oregon Steel Mills' ICA baghouse's and reheat furnace's emissions. The baghouse test will measure particulate, lead, and visible emissions from the baghouse and carbon-monoxide (CO), nitrogen-oxide (NO_x), sulfur-dioxide (SO_2), and volatile-organic-compound (VOC) emissions in the baghouse inlet. You will calculate emission factors based on cold charges to the electric-arc furnace. You will test compliance of filterable-particulate and sulfur-dioxide concentrations. You plan to test on November 7, 2001.

Oregon Steel Mills' Title V Operating Permit Conditions require annual emissions tests:

37. Verify emission factors for filterable particulate matter, lead, carbon monoxide, nitrogen oxides, and volatile organic compounds.

38. Measure filterable particulate grain loading.

39. Measure sulfur-dioxide concentrations, at least during the permit's first two years.

I approve your test plan for the baghouse with these conditions:

1. Tell me the lead sample solutions' volumes for analysis. I will then order audit samples. Send only filter audit samples with field samples for particulate-analysis.

2. Use analyzer ranges and calibrations corresponding to expected measurements.

   Check most measurement levels with non-zero calibration gases. December 2000 results suggest about 50, 150, and 500 ppm CO, 5 to 10 and 20 to 50 ppm NO_x, 2 to

5 and 7 to 15 ppm SO_2, and 1 to 3, 3 to 8, and 8 to 30 ppm propane.

3. Check non-VOC analyzers for interferences. Sections 6.2 in EPA Methods 3A and 7E require doing so before first field use and whenever you change analyzers in ways that could affect interference responses. Follow Section 5.4 in Method 20. Document in all test reports.

4. Oregon Method 8 requires two blank filters.

5. The laboratory performing lead analyses should identify the digestion, analytical, and quality-control procedures that they follow and record the analytical sample volumes.

6. Have the laboratories read and perform the quality control in Section 8 in your plan.

7. In the future, send laboratory quality-assurance plans with test plans. See 40 CFR 63.7(c). List quality-control procedures and their frequency.

8. Oregon Steel Mills is to document any significant furnace production delays.

9. Oregon Steel Mills is to send me one (1) test report within seventy-five (75) days after testing.

Please call me at 503-229-5579 if you have questions or change the test schedule or plan. My fax number is 229-5265. Herbert.jack@deq.state.or.us is my email address.

Sincerely,

Jack Herbert
Source Testing Coordinator

JHH

c: Greg Grunow:NWR