Horizon Engineering

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EMISSIONS TEST REPORT

CASCADE STEEL ROLLING MILLS

Electric Arc Furnace Baghouse Gases

McMinnville, Oregon
March 3, 1995

Prepared for

Cascade Steel Rolling Mills, Inc.
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Introduction

Cascade Steel Rolling Mills (CSRM) operates an electric arc furnace, steel casting, and rolling operation at its plant in McMinnville, Oregon. The Electric Arc Furnace Baghouse exhaust was tested on March 3, 1995, for NO_X, CO, Volatile Organic Compounds (VOCs), and SO_2 emissions. Three Summa canister samples were also taken in the exhaust for analysis of the TO-14 list and any tentatively identified compounds (TICS). These tests were conducted to gain additional information for the Title V emission inventory for the plant.

Horizon Engineering personnel Kurt Torgerson and David Broderick conducted the tests. Daniel Lee, Environmental Specialist for Cascade Steel, arranged for the testing program and served as liaison while testing.

Summary of Results

Table 1 shows a summary of the results of the continuous monitoring tests and source parameters. Table 2 lists the results of the tests made to quantify individual organic compounds. The five highest compounds are listed as well as methane and total gaseous non-methane compounds (TGOC). Complete results are found in the Appendix.

Table 1
EAF Baghouse Test Results

March 3, 1995

Sampling Results	**Run 1**	**Run 2**	**Run 3**	**Average**
Sampling time, min	74	61	74	69.67
O_2 %	20.5	20.5	20.4	20.5
CO_2 %	0.52	0.51	0.55	0.53
CO, lb/hr	212	127	227	189
CO, ppm	128	76	136	113
NO_x, lb/hr	38.8	34.6	32.4	35.3
NO_x, ppm	14	13	12	13
SO_2, lb/hr	8.1	5.8	11.2	8.4
SO_2, ppm	2.1	1.5	2.9	2.2
VOC, lb/hr	21.1	18.2	22.1	20.4
VOC, ppm	29	25	31	29
Source Parameters @ Inlet Duct				
Flowrate, dscf/min (standard)	385,300	380,400		382,800
Flowrate, acf/min (actual)	467,400	476,600		472,00
Stack velocity, ft/min	4,470	4,560		4,510
Temperature, °F (avg. inlet duct)	162	175		168
Percent moisture in stack gas	1.40	2.56		1.98
Sampling Start Time	10:50	12:14	13:40	
Sampling Stop Time	12:04	13:15	14:54	

Table 2

TO-14 List

March 3, 1995

	Run 1	Run 2	Run 3	Average
Chloromethane, lb/hr	0.039	0.023	0.043	0.035
Benzene, lb/hr	0.857	0.245	0.833	0.645
Toluene, lb/hr	0.143	0.046	0.087	0.092
m- & p Xylene, lb/hr	0.033	0.016	0.019	0.022
Styrene, lb/hr	0.093	0.024	0.082	0.066
Methane, lbC/hr (as carbon)	12.0	10.7	12.9	11.9
Tot. Gas. Non-Meth., lbC/hr	6.44	3.51	7.23	5.73
Sampling Start Time	10:45	12:03	13:36	
Sampling Stop Time	12:01	13:15	14:55	
TICS (highest of 29 found)				
Silanol, trimethyl-, ppbv	63	3.6	3.8	
Butane, ppbv	2.3	2.3	2.4	
Pentane, ppbv	1.6	1.2	1.3	
1-Propene, ppbv	20.0	5.1		
Propane, ppbv	3.4	3.9		
2-Propanone, ppbv	10.0		9.2	

Source Description

A Danielli electric arc furnace, with a capacity of about 100 tons of recycled steel, is used for the primary melting process. The furnace is located in the east end of the melt shop. A smaller "ladle metallurgy" arc furnace is used for final alloying and heating of metal from the larger furnace before it is cast. After alloying, molten steel is transferred to casting at the west end of the melt shop. In casting, the molten metal is tapped, passed through tundishes and into water cooled molds. Up to five billets of continuously cast steel emerge from the molds and are cut to length with automatic cutoff torches. Production records for the test date are in the Appendix.

During a melt cycle, much of the gas and particulate material emitted by the main arc furnace is removed through a "fourth hole" in the top of the furnace. These hot gases, and those from a similar system on the ladle metallurgy furnace, pass through water cooled ducting to an air-to-air heat exchanger system for further heat removal. A booster fan, next to the building, serves the fourth hole ducts, ensuring adequate suction for good control at the furnace and overcoming the restriction of the heat exchange apparatus.

Emissions into the east end of the building, from the charging and tapping operations, are controlled with a high canopy hood in the roof of the building directly above the furnace and three "scavenger" pickups in the roof to the east of the furnace. The original high canopy hood system has three different evacuation ducts. The center section has had its damper removed so it is always drawing air. The outer two have dampers for control. There is also a damper on the scavengers.

Exhaust from the furnaces and the roof vents combine and are routed through a large circular overhead duct to the fan and baghouse system.

Particulate in the building that is not captured in the baghouse system exits through roof monitors in the roof peak on the west end of the building. The roof monitors run the length of the west end of the melt shop ceiling.

The baghouse is a Wheelabrator, shaker type unit, with 12 compartments of 416 bags each (4,992 bags total). Bags are each 8 inch diameter by 20 feet long and are made of Gore-tex. Each compartment is on a 15 minute cleaning cycle. The gas flow is shut off prior to shaking. Pressure drop on the individual compartments is continuously recorded on a computer system with typical values ranging from two to four inches of water. Total open area above the bags is about 5,225 ft^2.

Gas samples were taken from the clean side of compartment #12. To avoid loss of process gas flow during bag cleaning, the system was programmed to not clean compartment #12 during the testing. The compartment was cleaned once while the furnace was being repaired and the sampling was interrupted.

Sampling Methods

General Three one hour tests were run, each lasting through a complete heat cycle of about one hour. The gas analyzers were run continuously during the entire three test period to avoid missing any data during the what might be calibration periods. Operation of the furnace during the tests included two periods of furnace down time.

The table below describes the analyzers and methods used.

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	Horiba	PIR-2000	0-1000 ppm	NDIR	10
NO_X	TECO	10A/R	0-250 ppm	Chemiluminescent	7E
SO_2	West. Resch.	721M	0-100ppm	UV Photometric	6C
VOC	J.U.M. Engr.	VE-7	0-100 ppm	Flame Ionization	25A

Data was recorded every 10 seconds by a Rustrak Ranger II data logging system and on strip chart recorders as backup. The accompanying software for the data logger was used to calculate averages for the gas concentrations. Graphic printouts of the data logger information are in the Appendix.

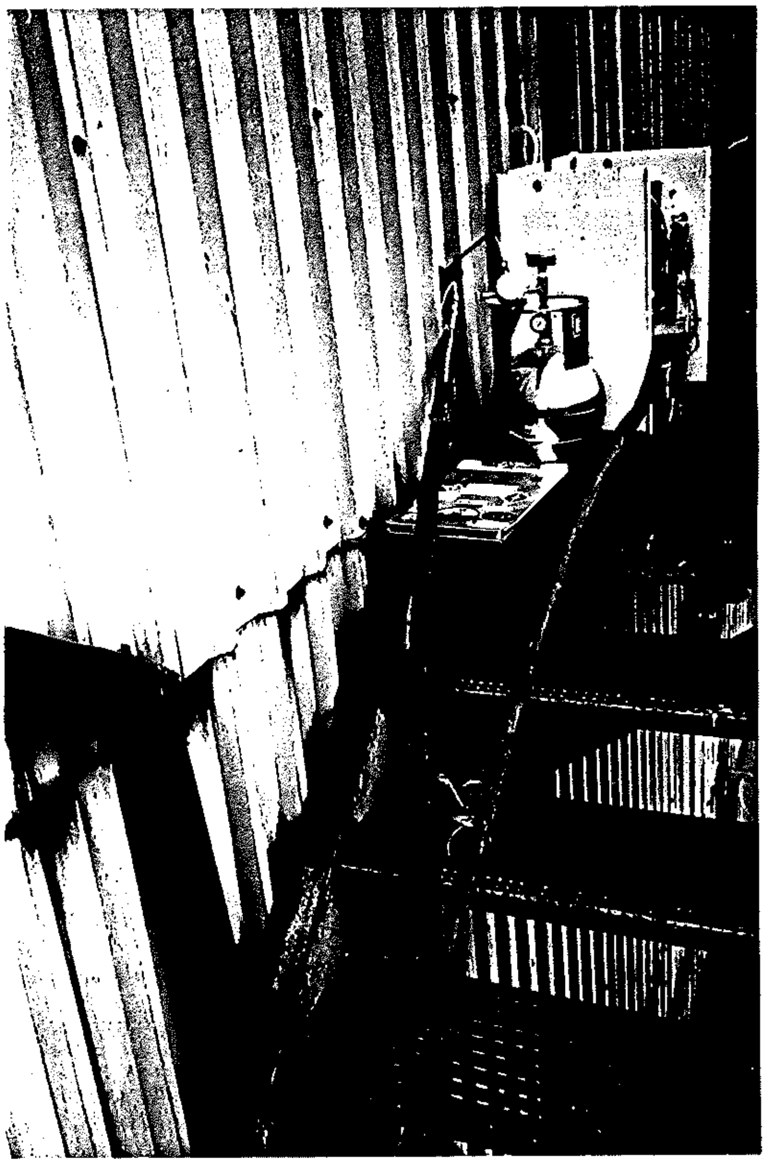
Sample for the analyzers was taken from fixed sampling probes in the clean side of bag compartment #12. Sample gas for the flame ionization analyzer was drawn through a heated sample line to the heated analyzer. Gas for the other analyzers was passed through a Baldwin Environmental thermoelectrically cooled gas conditioner and a Teflon umbilical to the analyzers located in a van on the ground. Figure 1 shows the sampling gear on the side of the baghouse. The black umbilical is the heated sample line. The white box is the sample gas conditioner for the other analyzers.

Our normal testing at this facility has been that each test run was from the start of one heat tap to the start of the next heat tap. Times when the furnace was down were excluded. For this work, results from the analyzers have been calculated two ways. The average for each discreet run and an average of these results have been presented in the Results tables. An average emission concentration and rate have also been calculated for the entire five hour sampling period. Those results are on the worksheets in the Appendix.

Calibrations Zero, span, and bias checks were made on all the continuous monitors before and after the entire test period. Calibration error (linearity) checks were made at the beginning of the test day. Documentation for the quality assurance procedures is in the Appendix. Because of the long test period, the drift of the VOC instrument was greater than normally allowed for a one hour test. It was felt that it was more important to get complete data than to check calibrations after each furnace heat. The calculated results are corrected for instrument drift.

Compound Quantification CH2M Hill supplied six liter passivated stainless steel Summa cans with a 90 minute flow controller for sample collection and TO-14 analysis. Three cans were filled, one during each heat. Flow to the cans was shut off during periods of furnace repair time. The cans were returned to CH2M Hill for analysis by GC/MS. In addition to the 38 compounds normally scanned, any additional compounds were tentatively identified and quantified.

Figure 1
Sampling Location on the Baghouse



Compounds that were not detected in the samples have been calculated out as a mg/hr and lb/hr rate assuming emissions at just the detection limit. In the worksheets this is called the "upper" value. The "lower" values assume that the not detected compounds were zero.

Volume Flowrate Before the start of the first two tests the volume flowrate of the baghouse inlet duct was measured. An S-type pitot traverse was made through ports located near the duct support just north of the baghouse according to EPA Methods 1 and 2. Velocity pressure and temperature measurements were taken at 24 points (12 on each diameter) and moisture was determined using DEQ Method 4 (dry/wet bulb psychrometry). A Magnehelic gauge was used to measure velocity pressures and K-type thermocouples were used for temperatures. Access to the ports was with a manlift.

Discussion

The testing results should be valid in all respects. As mentioned, the drift for the VOC instrument was somewhat more than is normally desired but the results have been corrected for drift. All other quality assurance checks and calibrations were within allowable tolerances.

The results of the tests for individual compounds show emissions of benzene to be the highest at about 0.65 lb/hr. The next highest is toluene at about 0.09 lb/hr. Of the all the volatile organic compounds collected, methane was about double or more the non-methane total organic compounds.

The methane and total gaseous non-methane compounds from the Summa canister analysis totaled about 86% of the value found with the continuous flame ionization analyzer that was run during the tests.

APPENDIX

Gases

Worksheet- CEMs
Worksheet- VOC, CH4, C2H6, TGNMOC
Worksheet- TO-14
Worksheet- TICS
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Strip Charts
Quality assurance checks
Calibration gases
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Flow Rate Determination

Volume flowrate determination
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Thermocouple calibrations
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Process Records

Furnace Heat Sheet
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Administrative

Source Test Plan

Gaseous Emissions Determination

Cascade Steel Rolling Mill								kdt/drb
EAF Baghouse								csrm0395
03-Mar-95								03-Mar-95
Carbon Monoxide	CO	lb/(scf ppm)	CFFC	7.269E-08	lb/lb-mole			28.0106
Nitrogen Oxides	NO2	lb/(scf ppm)	CFFC	1.194E-07	lb/lb-mole			46.0055
Sulfur Dioxide	SO2	lb/(scf ppm)	CFFC	1.663E-07	lb/lb-mole			64.0628
Number of Completed Runs		3	1	2	3	Average		Average
System Calibration Time - Initial		Tci	10:10	10:10	10:10	*10:10*		
Test Time-Starting		Tts	10:49:54	12:14:00	13:40:00	*10:49:54*		
Test Time-Ending		Tte	12:04:00	13:15:00	14:53:53	*14:53:53*		
System Calibration Time - Final		Tcf	15:00	15:00	15:00	*15:00*		
Test Mid-point Time		Tx	11:26	12:44	14:16	*12:51*		
Total Test Time			01:14	01:01	01:13	*04:03*		
Volumetric Flowrate, Dry Standard (Average)	dscf/m	Qsd	382,812	382,812	382,812	*382,812*		
Molecular weight, Dry Stack	lb/lb-mole	Md	29.026	29.023	29.027	*29.020*		29.025
Oxygen	**O2**	Span	25	25	25	*25*		
Indicated average - Dry	%	Cid	20.21	20.18	20.14	*20.22*		20.18
Cylinder Value - High Range calibration gas	%	Cma	11.22	11.22	11.22	*11.22*		
Cylinder Value - Low Range (Zero) calibration gas	%	Coa	0.00	0.00	0.00	*0.00*		
System Calibration Response - High Range gas - Initial	%	Cmi	11.09	11.09	11.09	*11.09*		
System Calibration Response - Low Range gas - Initial	%	Coi	0.10	0.10	0.10	*0.10*		
System Calibration Response - Low Range gas - Final	%	Cof	0.08	0.08	0.08	*0.08*		
System Calibration Response - High Range gas - Final	%	Cmf	11.10	11.10	11.10	*11.10*		
Actual average - Dry (Corrected for Drift)	%	Cgas	**20.52**	**20.48**	**20.43**	***20.52***		**20.48**
Carbon Dioxide	**CO2**	Span	25	25	25	*25*		
Indicated average - Dry	%	Cid	0.49	0.50	0.55	*0.47*		0.51
Cylinder Value - High Range calibration gas	%	Cma	22.05	22.05	22.05	*22.05*		
Cylinder Value - Low Range (Zero) calibration gas	%	Coa	0.00	0.00	0.00	*0.00*		
System Calibration Response - High Range gas - Initial	%	Cmi	22.01	22.01	22.01	*22.01*		
System Calibration Response - Low Range gas - Initial	%	Coi	-0.04	-0.04	-0.04	*-0.04*		
System Calibration Response - Low Range gas - Final	%	Cof	0.01	0.01	0.01	*0.01*		
System Calibration Response - High Range gas - Final	%	Cmf	22.04	22.04	22.04	*22.04*		
Actual average - Dry (Corrected for Drift)	%	Cgas	**0.52**	**0.51**	**0.55**	***0.48***		**0.53**
Carbon Monoxide	**CO**	Span	1000	1000	1000	*1000*		
Number of Completed Runs			3					
Indicated average - Dry	ppmv	Cid	129.6	78.9	139.2	*108.0*		115.9
Cylinder Value - High Range calibration gas	ppmv	Cma	920.0	920.0	920.0	*920.0*		
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.0	0.0	0.0	*0.0*		
System Calibration Response - High Range gas - Initial	ppmv	Cmi	923.6	923.6	923.6	*923.6*		
System Calibration Response - Low Range gas - Initial	ppmv	Coi	2.7	2.7	2.7	*2.7*		
System Calibration Response - Low Range gas - Final	ppmv	Cof	3.1	3.1	3.1	*3.1*		
System Calibration Response - High Range gas - Final	ppmv	Cmf	923.9	923.9	923.9	*923.9*		
Actual average - Dry (Corrected for Drift)	ppmv	Cgas	126.7	75.9	136.0	*105.0*		112.9
Mass Emissions	lb / hr		**211.5**	**126.8**	**227.1**	***175.3***		**188.5**
Nitrogen Oxides	**NO2**	Span	250	250	250	*250*		
Number of Completed Runs			3					
Indicated average-Dry	ppmv	Cid	12.73	11.22	10.42	*11.10*		11.46
Cylinder Value - High Range calibration gas	ppmv	Cma	214.30	214.30	214.30	*214.30*		
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	*0.00*		
System Calibration Response - High Range gas - Initial	ppmv	Cmi	209.90	209.90	209.90	*209.90*		
System Calibration Response - Low Range gas - Initial	ppmv	Coi	-1.20	-1.20	-1.20	*-1.20*		
System Calibration Response - Low Range gas - Final	ppmv	Cof	-1.00	-1.00	-1.00	*-1.00*		
System Calibration Response - High Range gas - Final	ppmv	Cmf	206.20	206.20	206.20	*206.20*		
Actual average - Dry (Corrected for Drift)	ppmv	Cgas	14.16	12.62	11.81	*12.50*		12.86
Mass Emissions	lb / hr		**38.82**	**34.62**	**32.38**	***34.29***		**35.28**
Sulfur Dioxide	**SO2**	Span	100	100	100	*100*		
Number of Completed Runs			3					
Indicated average-Dry	ppmv	Cid	3.95	4.83	7.88	*5.85*		5.55
Cylinder Value - High Range calibration gas	ppmv	Cma	88.40	88.40	88.40	*88.40*		
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	*0.00*		
System Calibration Response - High Range gas - Initial	ppmv	Cmi	83.50	83.50	83.50	*83.50*		
System Calibration Response - Low Range gas - Initial	ppmv	Coi	0.50	0.50	0.50	*0.50*		
System Calibration Response - Low Range gas - Final	ppmv	Cof	6.02	6.02	6.02	*6.02*		
System Calibration Response - High Range gas - Final	ppmv	Cmf	86.40	86.40	86.40	*86.40*		
Actual average - Dry (Corrected for Drift)	ppmv	Cgas	2.13	1.50	2.93	*2.46*		2.19
Mass Emissions	lb / hr		8.14	5.75	11.20	*9.39*		8.36

Gaseous Emissions Determination

Cascade Steel Rolling Mill						kdt/drb
EAF Baghouse .						csrm0395
03-Mar-95						03-Mar-95
Total Gaseous Organic Concentration	C	lb/(scf ppm)	CFFC	3.117E-08	lb/lb-mole	12.0112
Methane	CH4	lb/(scf ppm)	CFFC	4.164E-08	lb/lb-mole	16.0430
Ethane	C2H6	lb/(scf ppm)	CFFC	7.804E-08	lb/lb-mole	30.0701

Number of Completed Runs		3	1	2	3	*Average*	Average
System Calibration Time - Initial		Tci	10:10:00	10:10:00	10:10:00	*10:10:00*	
Test Time-Starting		Tts	10:49:54	12:14:00	13:40:00	*10:49:54*	
Test Time-Ending		Tte	12:04:00	13:15:00	14:53:53	*14:53:53*	
System Calibration Time - Final		Tcf	15:00:00	15:00:00	15:00:00	*15:00:00*	
Test Mid-point Time		Tx	11:26	12:44	14:16	*12:51*	
Total Test Time			01:14	01:01	01:13	*04:03*	
Volumetric Flowrate, Dry Standard (Average)	dscf/m	Qsd	382,812	382,812	382,812	*382,812*	
Molecular weight, Dry Stack	lb/lb-mole	Md	29.026	29.023	29.027	*29.020*	29.025
Oxygen %	**O2**	Cd	20.52	20.48	20.43	*20.52*	20.48
Carbon Dioxide %	**CO2**	Cd	0.52	0.51	0.55	*0.48*	0.53
Total Gaseous Organic Concentration	(TGOC/VOC)	Span	100	100	100	*100*	
Number of Completed Runs			3				
Span Gas- Instrument Response Factor	JUM Factor	CH4	1.04	1.04	1.04	*1.04*	
Span Gas- Carbon Count Equivalent		K	1	1	1	*1*	
Span Gas- Actual Concentration	ppmv		96.9	96.9	96.9	*96.9*	
Moisture, % Stack gas (Average)		Bws	1.98	1.98	1.98	*1.98*	
Indicated average- Wet	ppmv	Ciw	28.04	22.14	25.28	*24.64*	25.15
Indicated average- Dry	ppmv	Cid	28.61	22.59	25.79	*25.14*	25.66
Cylinder Value - High Range calibration gas	ppmv	Cma	96.90	96.90	96.90	*96.90*	
Cylinder Value - Low Range (Zero) calibration gas	ppmv	Coa	0.00	0.00	0.00	*0.00*	
System Calibration Response - High Range gas - Initial	ppmv	Cmi	96.60	96.60	96.60	*96.60*	
System Calibration Response - Low Range gas - Initial	ppmv	Coi	0.18	0.18	0.18	*0.18*	
System Calibration Response - Low Range gas - Final	ppmv	Cof	-5.90	-5.90	-5.90	*-5.90*	
System Calibration Response - High Range gas - Final	ppmv	Cmf	86.90	86.90	86.90	*86.90*	
Actual average - Dry (Corrected for Drift & Response)	ppmv-C		29.41	25.36	30.82	*28.06*	28.53
Actual average - Dry	ppmv-C	Cgas	29.41	25.36	30.82	*28.06*	28.53
Mass Emissions	lb / hr		21.05	18.16	22.07	*20.09*	20.43
METHANE	ug/m3	CH4	11,200	9,980	12,000		
Reporting Limit	ug/m3		234	240	244		
Actual Concentration	ppmv	CH4	16.8	15.0	18.0		
Primary Pollutant - Instrument Response Factor	JUM Factor	CH4	1.04	1.04	1.04		
Primary Pollutant - Carbon Count	Carbons	K	1.00	1.00	1.00		
Primary Pollutant - Actual average - Dry (Jum Responce)	ppmv	C	17.4	15.5	18.7		
Mass Emissions	lb/hr	CH4	16.06	14.31	17.21		15.86
	lb/hr	C	12.02	10.71	12.88		11.87
Percent of TGOC			59.2%	61.2%	60.5%		
ETHANE	ug/m3	C2H6	292	300	305		
Reporting Limit	ug/m3		292	300	305		
Actual Concentration	ppmv	C2H6	0.23	0.24	0.24		
Primary Pollutant - Instrument Response Factor	JUM Factor	C2H6	1.00	1.00	1.00		
Primary Pollutant - Carbon Count	Carbons	K	2.00	2.00	2.00		
Primary Pollutant - Actual average - Dry (Jum Responce)	ppmv	C	0.5	0.5	0.5		
Mass Emissions	lb/hr	C2H6	0.42	0.43	0.44		0.43
	lb/hr	C	0.33	0.34	0.35		0.34
Percent of TGOC			1.6%	1.9%	1.6%		
TOTAL NON-METHANE ORGANIC CARBON	ug/m3	TNMOC	4,490	2,450	5,040		
Reporting Limit	ug/m3		250	250	250		
Actual Concentration	ppmv	C	8.99	4.91	10.09		
Primary Pollutant - Instrument Response Factor	JUM Factor	C	1.00	1.00	1.00		
Primary Pollutant - Carbon Count	Carbons	K	1.00	1.00	1.00		
Primary Pollutant - Actual average - Dry (Jum Responce)	ppmv	C	9.0	4.9	10.1		
Mass Emissions	lb/hr	C	6.44	3.51	7.23		5.73
Percent of TGOC			30.6%	19.3%	32.7%		
TGOC	ppmv-C	EPA 25A	29.4	25.4	30.8		28.5
Methane + TNMOC	ppmv-C	EPA TO-12	26.4	20.4	28.8		25.2
TGOC	lb / hr-C	EPA 25A	21.1	18.2	22.1		20.4
Methane + TNMOC	lb / hr-C	EPA TO-12	18.5	14.2	20.1		17.6

LARGE DRIFT

(ug/m3)=(ppmv/1,000,000)*35.3147(ft3/m3)*453,592,370(ug/lbm)*mw(lbm/lbmol) 385.3211(dscf/lbmol)

Gaseous Emissions Determination

Cascade Steel Rolling Mill EAF Baghouse 03-Mar-95 EPA TO-14		1 ug/m3	2 ug/m3	3 ug/m3	Detect Limit ug/m3	Detect Limit ug/m3	Detect Limit ug/m3	Average (Upper) ug/m3 <	Average (Lower) ug/m3 >=	1 (Upper) mg/hr <	2 (Upper) mg/hr <	3 (Upper) mg/hr <	Average (Upper) mg/hr <	Average (Lower) mg/hr >=	Average (Upper) lb/hr <	Average (Lower) lb/hr >=
Standard Sample Volume	dscf	n/a	n/a	n/a									0			
Standard Flowrate, Qsd (Average)	dscf/m	382,844	382,844	382,844									382,844			
Dichloro-difluoromethane	ug/m3	ND	ND	ND	12	12	12	12.0	0.0	7,805	7,805	7,805	7,805	0	0.02	0.00
Chloromethane	ug/m3	**27**	**16**	**30**	4.9	5	5.1	24.3	24.3	17,562	10,407	19,514	**15,828**		**0.035**	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ug/m3	ND	ND	ND	17	17	17	17.0	0.0	11,058	11,058	11,058	11,058	0	0.02	0.00
Vinyl Chloride	ug/m3	3.9	ND	3.7	6.1	6.2	6.3	6.2	2.5	3,968	4,033	4,098	4,033	1,648	0.01	0.00
Bromomethane	ug/m3	ND	ND	5.3	9.2	9.5	9.6	9.4	1.8	5,984	6,179	6,244	6,136	1,149	0.01	0.00
Chloroethane	ug/m3	ND	ND	ND	6.3	6.4	6.5	6.4	0.0	4,098	4,163	4,228	4,163	0	0.01	0.00
Trichlrofluoromethane	ug/m3	8.8	ND	13	13	14	14	13.7	7.3	8,456	9,106	9,106	8,890	4,727	0.02	0.01
1,1-Dichloroethene	ug/m3	ND	ND	ND	9.4	9.7	9.8	9.6	0.0	6,114	6,309	6,374	6,266	0	0.01	0.00
Methylene Chloride	ug/m3	4.6	ND	ND	8.3	8.5	8.6	8.5	1.5	5,399	5,529	5,594	5,507	997	0.01	0.00
1,1,2-Trichlro-1,2,2-trifluoroethane	ug/m3	ND	ND	ND	18	19	19	18.7	0.0	11,708	12,359	12,359	12,142	0	0.03	0.00
1,1-Dichloroethane	ug/m3	ND	ND	ND	9.6	9.9	10	9.8	0.0	6,244	6,440	6,505	6,396	0	0.01	0.00
1,2-Dichloroethene (Cis)	ug/m3	ND	ND	ND	9.4	9.7	9.8	9.6	0.0	6,114	6,309	6,374	6,266	0	0.01	0.00
Chloroform	ug/m3	ND	ND	ND	12	12	12	12.0	0.0	7,805	7,805	7,805	7,805	0	0.02	0.00
1,2-Dichloroethane	ug/m3	ND	ND	ND	9.6	9.9	10	9.8	0.0	6,244	6,440	6,505	6,396	0	0.01	0.00
1,1,1-Trichloroethane	ug/m3	ND	ND	ND	13	13	14	13.3	0.0	8,456	8,456	9,106	8,673	0	0.02	0.00
Benzene	ug/m3	**598**	**171**	**581**	7.6	7.8	7.9	450.0	450.0	388,973	111,228	377,915	**292,705**		**0.645**	
Carbon Tetrachloride	ug/m3	ND	ND	ND	15	15	16	15.3	0.0	9,757	9,757	10,407	9,974	0	0.02	0.00
1,2-Dichloropropane	ug/m3	ND	ND	ND	11	11	11	11.0	0.0	7,155	7,155	7,155	7,155	0	0.02	0.00
Trichloroethylene	ug/m3	ND	ND	ND	13	13	13	13.0	0.0	8,456	8,456	8,456	8,456	0	0.02	0.00
1,3-Dichloropropene (Cis)	ug/m3	ND	ND	ND	11	11	11	11.0	0.0	7,155	7,155	7,155	7,155	0	0.02	0.00
1,3-Dichloropropene (Trans)	ug/m3	ND	ND	ND	11	11	11	11.0	0.0	7,155	7,155	7,155	7,155	0	0.02	0.00
1,1,2-Trichloroethane	ug/m3	ND	ND	ND	13	13	14	13.3	0.0	8,456	8,456	9,106	8,673	0	0.02	0.00
Toluene	ug/m3	**100**	**32**	**61**	9	9.2	9.4	64.3	64.3	65,046	20,815	39,678	**41,846**		**0.092**	
1,2-Dibromoethane	ug/m3	ND	ND	ND	18	19	19	18.7	0.0	11,708	12,359	12,359	12,142	0	0.03	0.00
Tetrachloroethylene	ug/m3	ND	ND	ND	16	17	17	16.7	0.0	10,407	11,058	11,058	10,841	0	0.02	0.00
Chlorobenzene	ug/m3	6.2	ND	ND	11	11	11	11.0	2.1	7,155	7,155	7,155	7,155	1,344	0.02	0.00
Ethylbenzene	ug/m3	**13**	ND	8.4	10	11	11	11.7	7.1	8,456	7,155	7,155	7,589	4,640	0.02	0.01
m- & p-Xylene	ug/m3	**23**	**11**	**13**	10	11	11	15.7	15.7	14,960	7,155	8,456	**10,190**		**0.022**	
Styrene	ug/m3	**65**	**17**	**57**	10	10	11	46.3	46.3	42,280	11,058	37,076	**30,138**		**0.066**	
1,1,2,2-Tetrachloroethane	ug/m3	12	ND	ND	16	17	17	16.7	4.0	10,407	11,058	11,058	10,841	2,602	0.02	0.01
o-Xylene	ug/m3	ND	ND	ND	10	11	11	10.7	0.0	6,505	7,155	7,155	6,938	0	0.02	0.00
1,3,5-Trimethylbenzene	ug/m3	ND	ND	ND	12	12	12	12.0	0.0	7,805	7,805	7,805	7,805	0	0.02	0.00
1,2,4-Trimethylbenzene	ug/m3	6.1	ND	ND	12	12	12	12.0	2.0	7,805	7,805	7,805	7,805	1,323	0.02	0.00
1,3-Dichlorobenzene	ug/m3	ND	ND	ND	14	15	15	14.7	0.0	9,106	9,757	9,757	9,540	0	0.02	0.00
1,4-Dichlorobenzene	ug/m3	ND	ND	ND	14	15	15	14.7	0.0	9,106	9,757	9,757	9,540	0	0.02	0.00
1,2-Dichlorobenzene	ug/m3	ND	ND	ND	14	15	15	14.7	0.0	9,106	9,757	9,757	9,540	0	0.02	0.00
1,2,4-Trichlorobenzene	ug/m3	13	ND	ND	18	18	18	18.0	4.3	11,708	11,708	11,708	11,708	2,819	0.03	0.01
Hexachlorobutadiene	ug/m3	ND	ND	ND	25	26	26	25.7	0.0	16,261	16,912	16,912	16,695	0	0.04	0.00
													668,950	411,955	1.475	0.908

Mass emissions (g/hr) = (ug/m3) * Qsd(dscf/m) * 60(m/hr) * 453.59237(g/lb) /16,018,464,861 (lb-m3/ug-cuft)

(g/hr) = (ppbv/1,000,000,000) * Qsd(dscf/m) * 60(m/hr) * 453.59237(g/lb) * mw(lb/lb-mol) / 385(dscf/lb-mol)

where (ug/m3) = (ppbv/1,000,000,000) * 3.5314e-7(cuft/m3) * 453,592,370(ug/lb) * mw(lb/lb-mol) / 385(dscf/lb-mol)

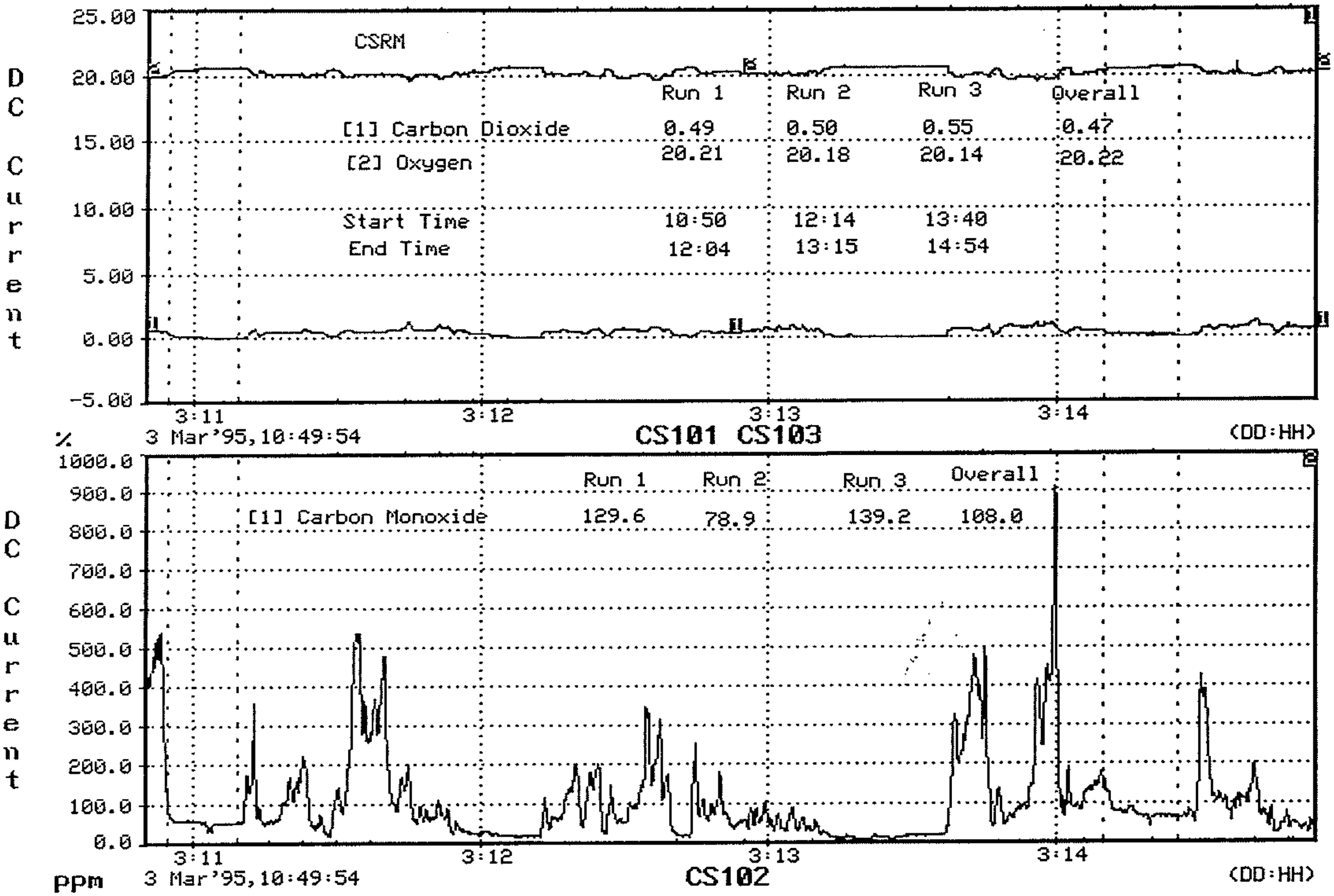
Gaseous Emissions Determination

Cascade Steel Rolling Mill				
EAF Baghouse				
03-Mar-95				
TICS		Run1	Run2	Run3
Silanol, trimethyl-	ppbv	63.0	3.6	3.8
Butane	ppbv	2.3	2.3	2.4
Pentane	ppbv	1.6	1.2	1.3
1-Propene	ppbv	20.0	5.1	
Propane	ppbv	3.4	3.9	
2-Propanone	ppbv	10.0		9.2
2-Propanol	ppbv	1.4		1.5
Butanoic acid, butyl ester	ppbv		1.4	2.7
Benzene, 1-methyl-4-(1-methylethyl)-	ppbv		1.1	2.8
1-Butene	ppbv	3.8		
Silane, butoxytrimethyl-	ppbv	1.8		
Silane, ethoxytrimethyl-	ppbv	1.7		
1-Methoxy-2-propyl ester of acetic acid	ppbv	1.6		
2-Propenal	ppbv	1.5		
1-Buten-3-yne	ppbv	1.3		
Decane	ppbv	1.0		
Ethanone, 1-phenyl-	ppbv	1.0		
Methane, nitro-	ppbv		2.6	
Hexanoic acid, ethyl ester	ppbv		1.4	
Phosphanoxyd, trimethyl-	ppbv		1.4	
1-Propene, 2-methyl-	ppbv		1.2	
1-Hexanol	ppbv			13.0
2-Buten-1-ol	ppbv			5.7
Acetic acid	ppbv			2.5
Ethene, 1-chloro-2-fluoro-	ppbv			2.3
Hydrazine, 1,2-dimethyl-	ppbv			2.3
Cyclopropane, butyl-	ppbv			1.6
1-Propanol, 2-methyl-	ppbv			1.5
3-Heptanone	ppbv			1.4

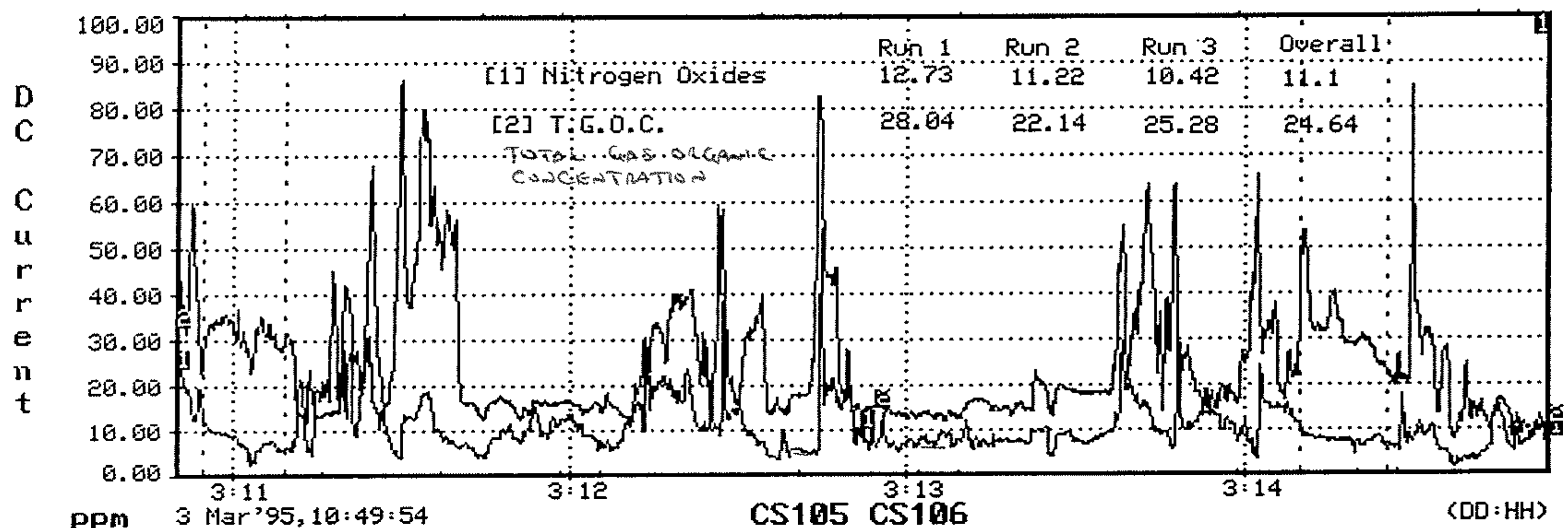
Mass emissions (g/hr) = (ug/m3) * Qsd(dscf/m) * 60(m/hr) * 453.59237(g/lb) /16,018,464,861 (lb-m3/ug-cuft)

(g/hr) = (ppbv/1,000,000,000) * Qsd(dscf/m) * 60(m/hr) * 453.59237(g/lb) * mw(lb/lb-mol) / 385(dscf/lb-mol)

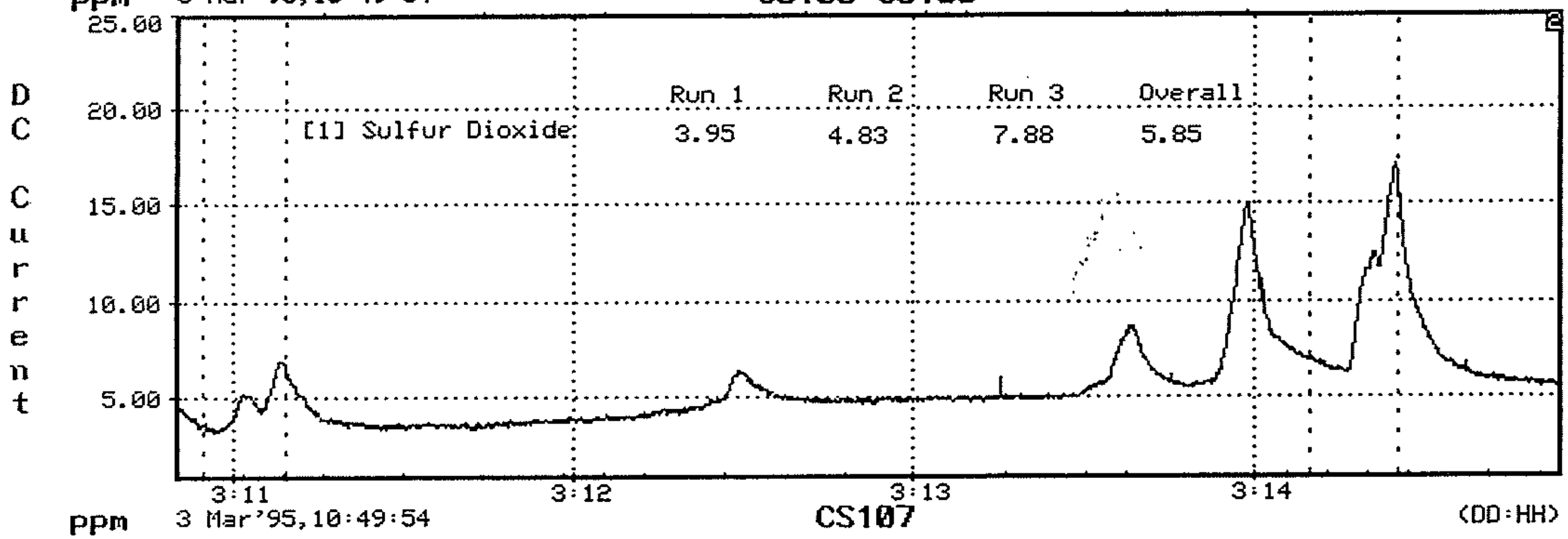
where (ug/m3) = (ppbv/1,000,000,000) * 35.31467(cuft/m3) * 453,592,370(ug/lb) * mw(lb/lb-mol) / 385(dscf/lb-mol)



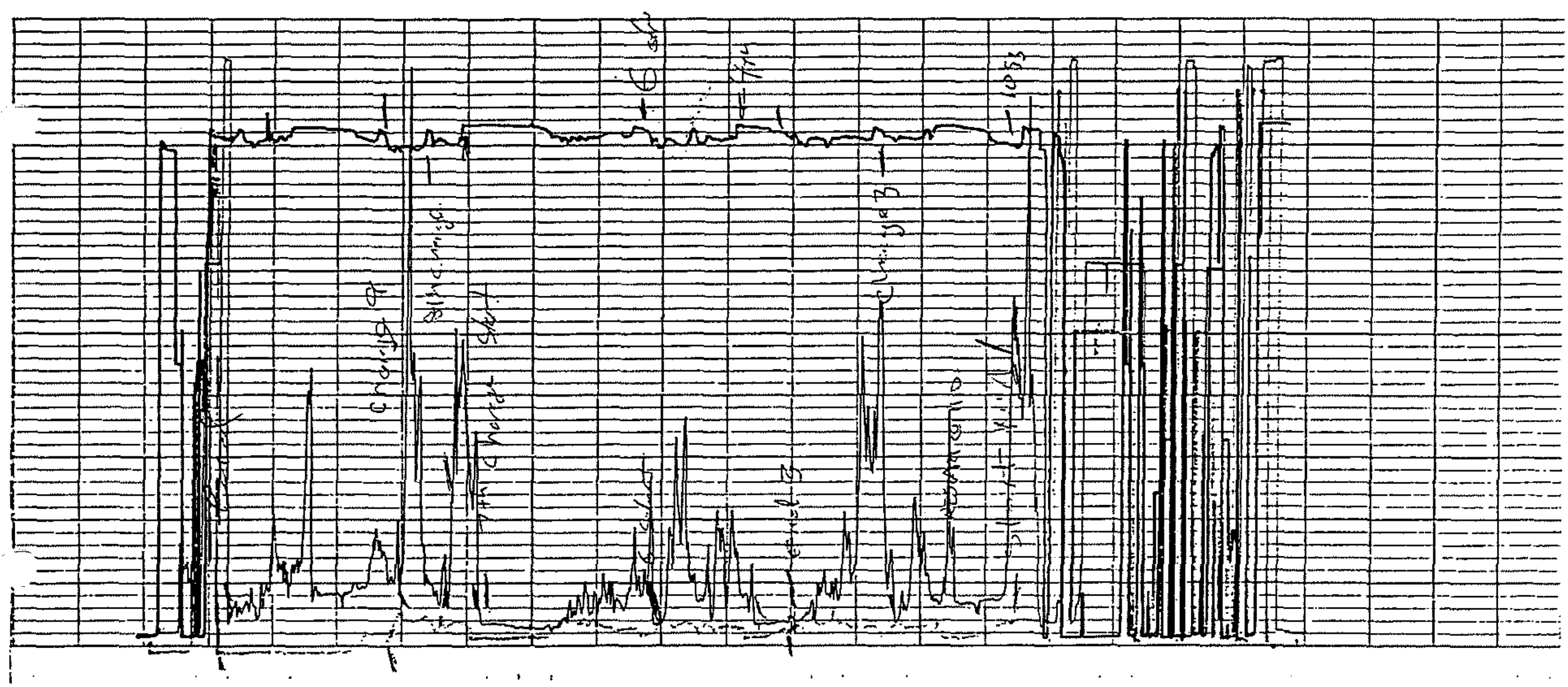
CSRM
Run 1
Run 2
Run 3
Overall
[1] Carbon Dioxide 0.49 0.50 0.55 0.47
[2] Oxygen 20.21 20.18 20.14 20.22
Start Time 10:50 12:14 13:40
End Time 12:04 13:15 14:54
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
DC Current
%
3:11
3:12
3:13
3:14
3 Mar'95,10:49:54
CS101 CS103
(DD:HH)
Run 1
Run 2
Run 3
Overall
[1] Carbon Monoxide 129.6 78.9 139.2 108.0
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
DC Current
ppm
3:11
3:12
3:13
3:14
3 Mar'95,10:49:54
CS102
(DD:HH)



DC Current
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Run 1
Run 2
Run 3
Overall
[1] Nitrogen Oxides 12.73 11.22 10.42 11.1
[2] T.G.O.C. 28.04 22.14 25.28 24.64
TOTAL GAS ORGANIC CONCENTRATION
3:11
3:12
3:13
3:14
ppm
3 Mar'95,10:49:54
CS105 CS106
(DD:HH)

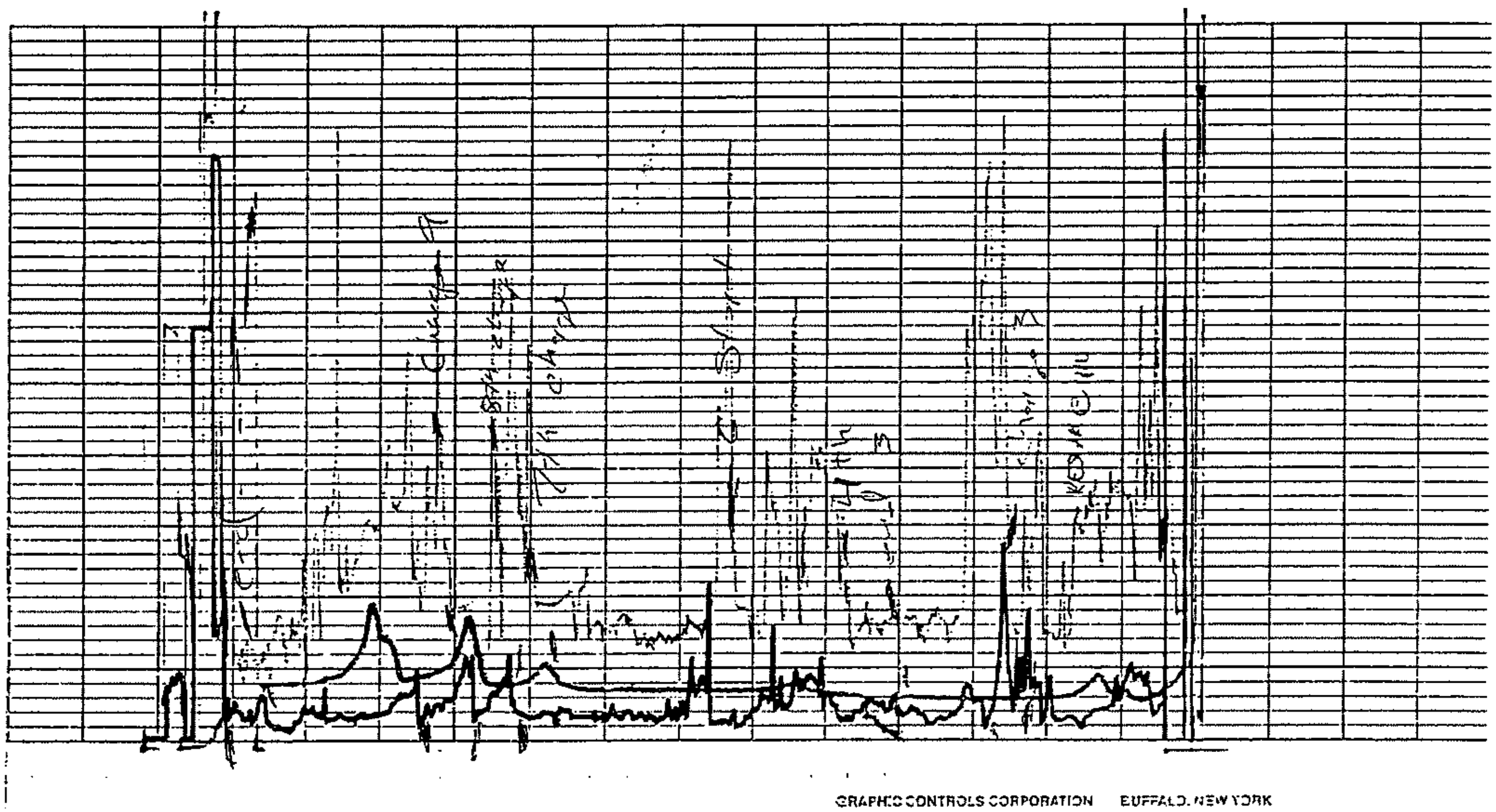


DC Current
25.00
20.00
15.00
10.00
5.00
Run 1
Run 2
Run 3
Overall
[1] Sulfur Dioxide 3.95 4.83 7.88 5.85
3:11
3:12
3:13
3:14
ppm
3 Mar'95,10:49:54
CS107
(DD:HH)



GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

PRINTE



GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

Gaseous Sampling 3a,6c,7e,10 &25A of 40CFR60

— SM Temp [illegible]
SUM Line 285F

Client CSEM
Date March 3, 95
Source Bunkhouse

Tester DRB / KDT
Observer
Time

Run	Span	Span ID	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference (2%)	Initial System Calibration Response	Initial System Calibration Bias (5%)	Final System Calibration Response	Final System Calibration Bias (5%)	Drift (3%)
Leak Checks											
GAS TYPE / UNITS	(SPAN)		(CV)	(ACR)	(AD)= |ACR-CV|	(AD / SPAN)	(SCRi)	(SCRi - ACR) / (SPAN)	(SCRf)	(SCRf - ACR) / (SPAN)	(SCRf - SCRi) / (SPAN)
Approx. Times				10:00			1010		1500		
CO2 %			22.05	22.07			22.01		22.04		
ch1 25			12.44	12.5							
			0	0.0			-0.04		0.01		
CO ppm			920	920			923.6		923.9		
ch2 1,000			605	597							
			0	0.0			2.7		3.1		
O2 %			20.95	21.0							
ch3 25			11.22	11.12			11.09		11.10		
			0	0.07			0.1		0.08		
NOx ppm			214.3	213.1			209.9		206.2		
ch5 250			151	148.4							
			0	-1.3			-1.2		-1.0		
SO2 ppm			88.4	89.3			83.5		86.4		
ch7 100			54.7	54.6							
			0	.12			.50		6.02		
TGOC ppm		CH_4	96.9				96.6		86.9		
ch 6		CH_4	63.8				63		56.9		
100		C_3H_8	10.83	31.14			32.2		25.07		
		N_2	0.0				0.18		-5.9		

Run 1 Start 1053 End [illegible] Marker #1 [illegible] #2 [illegible] #3 [illegible] #4 [illegible]

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

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENGØ1

TO:

DATE: Ø2/Ø1/95

DAVID ROSSMAN
HORIZON ENGINEERING
13585 NE WHITAKER WAY
PORTLAND, OR 9723Ø-

CUSTOMER ORDER NUMBER: ØØØ1162

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CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC97886	Carbon monoxide	92Ø ± 9 ppm	SRM 1681b
	Nitric oxide	214.3 ± 2.1 ppm	SRM 1685b
	Carbon dioxide	22.Ø5 ± Ø.22 %	SRM 1675b
	Methane	96.9 ± 1.Ø ppm	L2293
	Sulfur dioxide	177.4 ± 1.8 ppm	SRM 1661a
	Nitrogen,O2-Free	Balance	

ppm = umole/mole   % = mole-%

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

Analyst: Mark J. Monson
M.J. Monson

Approved: J.T. Marrin
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
NIST TRACEABLE GAS MIXTURES

HENG01

TO:

DAVID ROSSMAN
HORIZON ENGINEERING
13585 N.E. WHITAKER WAY
PORTLAND, OR 97230-

DATE: 02/01/95

CUSTOMER ORDER NUMBER: 0001170

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CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC1859	Carbon monoxide	605 $\pm$ 6 ppm	SRM 1681b
	Carbon dioxide	12.44 $\pm$ 0.12 %	SRM 1675b
	Nitric oxide	151.0 $\pm$ 1.5 ppm	SRM 1685b
	Methane	63.8 $\pm$ 0.6 ppm	L2293
	Sulfur dioxide	88.4 $\pm$ 1.8 ppm	SRM 1694a
	Nitrogen,O2-Free	Balance	

ppm = umole/mole   % = mole-%

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

Analyst: Mark Monson
M.J. Monson

Approved: JT Marrin
J.T. Marrin

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

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENG01

TO: DATE: 09/23/94

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

CUSTOMER ORDER NUMBER: 1090

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CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC99500	Carbon monoxide	319 $\pm$ 3 ppm	SRM 2636
	Nitric oxide	67.3 $\pm$ 0.7 ppm	SRM 1684b
	Carbon dioxide	5.79 $\pm$ 0.06 %	SRM 1674B
	Propane	10.83 $\pm$ 0.11 ppm	SRM 1667b
	Sulfur dioxide	54.7 $\pm$ 1.1 ppm	SRM 1693a
	Nitrogen,O2-Free	Balance	

ppm = umole/mole % = mole-%

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

Analyst: Mark Monson
M.J. Monson

Approved: [signature]
J.T. Marrin

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

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

HENGØ1

TO:

DATE: 11/Ø4/94

DAVE ROSSMAN
HORIZON ENGINEERING
13585 NE WHITAKER WAY
PORTLAND, OR 9723Ø-

CUSTOMER ORDER NUMBER: 1111

PAGE 1

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CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CAØ151Ø	Oxygen	11.22 ± Ø.11 %	SRM 2658a
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

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

Analyst: M.S. Calhoun

Approved: 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.

CH2M HILL

Engineers
Planners
Economists
Scientists

Corvallis Office

March 24, 1995

ASE39200.XX

Horizon Engineering
13585 NE Whitaker Way
Portland, OR 97230

RE: Analytical Data for Horizon Engineering CSRM #456
CVO Laboratory Reference No. 8276

Dear Mr. Mike Wallace:

On March 7, 1995, the CH2M HILL Corvallis Applied Sciences Laboratory received three samples with a request for analysis of selected parameters.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative.

Under CH2M HILL policy, your canister sample(s) will be stored for 10 days after reporting. If you have not given us prior instructions for disposal, the canister(s) will be cleaned within 10 days.

The CH2M HILL Applied Sciences Laboratory appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ms. Kathy McKinley at (503) 758-0235, extension 3144.

Sincerely,

Lynn White

Lynn White
Senior Data Package Specialist

Enclosures

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Science Laboratory Reference No. 8276

CVO Sample ID	Client Sample ID
827601	#636 Run1
827602	#551 Run2
827603	#638 Run3

CASE NARRATIVE
TOTAL NONMETHANE ORGANIC ANALYSIS

Lab Reference No.: 8276

Client/Project: Horizon Engineering CSRM #456

I. Holding Times:
All holding times were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Analytical Exceptions:
None

E. Other:
None

III. Sampling Equipment:
No exceptions.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: Jodi Bennett DATE: 3-23-95
Jodi Bennett
Supervisor, Air Toxics

CASE NARRATIVE
AIR TOXICS GC/MS ANALYSIS

Lab Reference No.: 8276

Client/Project: Horizon Engineering CSRM #456

I. Holding Times:
All holding times were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Tuning:
All acceptance criteria were met.

E. Surrogate Recoveries:
All acceptance criteria were met.

F. Other:
None

III. Documentation Exceptions:
None

IV. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: Jodi Bennett DATE: 3-23-95
Jodi Bennett
Supervisor, Air Toxics

CASE NARRATIVE
GC-FID

Lab Reference No.: 8276

Client/Project: Horizon Engineering CSRM #456

I. Holding Times:
All holding times were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Other:
None

III. Documentation Exceptions:
None

IV. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: Jodi Bennett DATE: 3-23-95
Jodi Bennett
Supervisor, Air Toxics

Corvallis Applied ;iences Laboratory

Client Information		**Lab Information**	
Project Name:	Horizon Engineering	Date Rec'd:	03/07/95
Project Manager:	Kurt Torgerson	Lab ID:	827601
Sampled By:	K. Torgerson	Date Analyzed:	03/20/95
Client Sample ID:	#636 Run1	Dilution Factor:	2.34
Sampling Date:	03/03/95	Analysis Method:	TO-14
Sampling Time:	10:45	Report Revision No.:	0
Type:	Not given	Reported By:	B. Thompson
Matrix:	Air	Reviewed By:	K. Danford
		Units:	µg/m3

Analyte	Reporting Limit	Sample Result	Qualifier
Dichlorodifluoromethane	12	12	U
Chloromethane	4.9	27	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	17	17	U
Vinyl chloride	6.1	3.9	J
Bromomethane	9.2	9.2	U
Chloroethane	6.3	6.3	U
Trichlorofluoromethane	13	8.8	J
1,1-Dichloroethene	9.4	9.4	U
Methylene Chloride	8.3	4.6	J
1,1,2-Trichloro-1,2,2-trifluoroethane	18	18	U
1,1-Dichloroethane	9.6	10	U
cis-1,2-Dichloroethene	9.4	9.4	U
Chloroform	12	12	U
1,2-Dichloroethane	9.6	10	U
1,1,1-Trichloroethane	13	13	U
Benzene	7.6	598	
Carbon Tetrachloride	15	15	U
1,2-Dichloropropane	11	11	U
Trichloroethylene	13	13	U
cis-1,3-Dichloropropene	11	11	U
trans-1,3-Dichloropropene	11	11	U
1,1,2-Trichloroethane	13	13	U
Toluene	9.0	100	
1,2-Dibromoethane	18	18	U
Tetrachloroethylene	16	16	U
Chlorobenzene	11	6.2	J
Ethylbenzene	10	13	
m,p-Xylene	10	23	
Styrene	10	65	
1,1,2,2-Tetrachloroethane	16	12	J
o-Xylene	10	10	U
1,3,5-Trimethylbenzene	12	12	U
1,2,4-Trimethylbenzene	12	6.1	J
1,3-Dichlorobenzene	14	14	U
1,4-Dichlorobenzene	14	14	U
1,2-Dichlorobenzene	14	14	U
1,2,4-Trichlorobenzene	18	13	J
Hexachlorobutadiene	25	25	U

J=Estimated value
U=Not detected at specified reporting limits
B=Blank contamination

Corvallis Applied ' iences Laboratory

Client Information		**Lab Information**	
Project Name:	Horizon Engineering	Date Rec'd:	03/07/95
Project Manager:	Kurt Torgerson	Lab ID:	827602
Sampled By:	K. Torgerson	Date Analyzed:	03/20/95
Client Sample ID:	#551 Run2	Dilution Factor:	2.4
Sampling Date:	03/03/95	Analysis Method:	TO-14
Sampling Time:	12:02	Report Revision No.:	0
Type:	Not given	Reported By:	B. Thompson
Matrix:	Air	Reviewed By:	K. Danford
		Units:	µg/m3

Analyte	Reporting Limit	Sample Result	Qualifier
Dichlorodifluoromethane	12	12	U
Chloromethane	5.0	16	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	17	17	U
Vinyl chloride	6.2	6.2	U
Bromomethane	9.5	9.5	U
Chloroethane	6.4	6.4	U
Trichlorofluoromethane	14	14	U
1,1-Dichloroethene	9.7	9.7	U
Methylene Chloride	8.5	8.5	U
1,1,2-Trichloro-1,2,2-trifluoroethane	19	19	U
1,1-Dichloroethane	9.9	10	U
cis-1,2-Dichloroethene	9.7	9.7	U
Chloroform	12	12	U
1,2-Dichloroethane	9.9	10	U
1,1,1-Trichloroethane	13	13	U
Benzene	7.8	171	
Carbon Tetrachloride	15	15	U
1,2-Dichloropropane	11	11	U
Trichloroethylene	13	13	U
cis-1,3-Dichloropropene	11	11	U
trans-1,3-Dichloropropene	11	11	U
1,1,2-Trichloroethane	13	13	U
Toluene	9.2	32	
1,2-Dibromoethane	19	19	U
Tetrachloroethylene	17	17	U
Chlorobenzene	11	11	U
Ethylbenzene	11	11	U
m,p-Xylene	11	11	
Styrene	10	17	
1,1,2,2-Tetrachloroethane	17	17	U
o-Xylene	11	11	U
1,3,5-Trimethylbenzene	12	12	U
1,2,4-Trimethylbenzene	12	12	U
1,3-Dichlorobenzene	15	15	U
1,4-Dichlorobenzene	15	15	U
1,2-Dichlorobenzene	15	15	U
1,2,4-Trichlorobenzene	18	18	U
Hexachlorobutadiene	26	26	U

J=Estimated value
U=Not detected at specified reporting limits
B=Blank contamination

Corvallis Applied ;iences Laboratory

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	03/07/95
Project Manager:	Kurt Torgerson	Lab ID:	827603
Sampled By:	K. Torgerson	Date Analyzed:	03/20/95
Client Sample ID:	#638 Run3	Dilution Factor:	2.44
Sampling Date:	03/03/95	Analysis Method:	TO-14
Sampling Time:	13:36	Report Revision No.:	0
Type:	Not given	Reported By:	B. Thompson
Matrix:	Air	Reviewed By:	K. Danford
		Units:	µg/m3

Analyte	Reporting Limit	Sample Result	Qualifier
Dichlorodifluoromethane	12	12	U
Chloromethane	5.1	30	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	17	17	U
Vinyl chloride	6.3	3.7	J
Bromomethane	9.6	5.3	J
Chloroethane	6.5	6.5	U
Trichlorofluoromethane	14	13	J
1,1-Dichloroethene	9.8	9.8	U
Methylene Chloride	8.6	8.6	U
1,1,2-Trichloro-1,2,2-trifluoroethane	19	19	U
1,1-Dichloroethane	10	10	U
cis-1,2-Dichloroethene	9.8	9.8	U
Chloroform	12	12	U
1,2-Dichloroethane	10	10	U
1,1,1-Trichloroethane	14	14	U
Benzene	7.9	581	
Carbon Tetrachloride	16	16	U
1,2-Dichloropropane	11	11	U
Trichloroethylene	13	13	U
cis-1,3-Dichloropropene	11	11	U
trans-1,3-Dichloropropene	11	11	U
1,1,2-Trichloroethane	14	14	U
Toluene	9.4	61	
1,2-Dibromoethane	19	19	U
Tetrachloroethylene	17	17	U
Chlorobenzene	11	11	U
Ethylbenzene	11	8.4	J
m,p-Xylene	11	13	
Styrene	11	57	
1,1,2,2-Tetrachloroethane	17	17	U
o-Xylene	11	11	U
1,3,5-Trimethylbenzene	12	12	U
1,2,4-Trimethylbenzene	12	12	U
1,3-Dichlorobenzene	15	15	U
1,4-Dichlorobenzene	15	15	U
1,2-Dichlorobenzene	15	15	U
1,2,4-Trichlorobenzene	18	18	U
Hexachlorobutadiene	26	26	U

J=Estimated value
U=Not detected at specified reporting limits
B=Blank contamination

Corvallis Applied Sciences Laboratory

TIC Report

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	3/7/95
Project Manager:	Kurt Torgerson	Lab ID:	827601
Sampled By:	K. Torgerson	Date Analyzed:	3/20/95
Client Sample ID:	#636 Run1	Dilution Factor:	2.34
Sampling Date:	3/3/95	Analysis Method:	TO-14
Sampling Time:	10:45	Report Revision No.:	0
Type:	Not given	Reported By:	B. Thompson
Matrix:	Air	Reviewed By:	K. Danford
		Units:	ppbv

Analyte	Sample Result	Qualifier
1-Propene	20	J
Propane	3.4	J
1-Butene	3.8	J
Butane	2.3	J
1-Buten-3-yne	1.3	J
2-Propenal	1.5	J
2-Propanone	10	J
2-Propanol	1.4	J
Pentane	1.6	J
Silanol, trimethyl-	63	J
Silane, ethoxytrimethyl-	1.7	J
Silane, butoxytrimethyl-	1.8	J
1-Methoxy-2-propyl ester of acetic acid	1.6	J
Decane	1.0	J
Ethanone, 1-phenyl-	1.0	J

J=Estimated value

Corvallis Applied Sciences Laboratory

TIC Report

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	3/7/95
Project Manager:	Kurt Torgerson	Lab ID:	827602
Sampled By:	K. Torgerson	Date Analyzed:	3/17/95
Client Sample ID:	#551 Run2	Dilution Factor:	2.4
Sampling Date:	3/3/95	Analysis Method:	TO-14
Sampling Time:	12:02	Report Revision No.:	0
Type:	Not given	Reported By:	B. Thompson
Matrix:	Air	Reviewed By:	K. Danford
		Units:	ppbv

Analyte	Sample Result	Qualifier
1-Propene	5.1	J
Propane	3.9	J
1-Propene, 2-methyl-	1.2	J
Butane	2.3	J
PHOSPHANOXYD, TRIMETHYL-	1.4	J
Pentane	1.2	J
Methane, nitro-	2.6	J
Silanol, trimethyl-	3.6	J
Butanoic acid, butyl ester	1.4	J
Hexanoic acid, ethyl ester	1.4	J
Benzene, 1-methyl-4-(1-methylethyl)-	1.1	J

J=Estimated value

Corvallis Applied Sciences Laboratory

TIC Report

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	3/7/95
Project Manager:	Kurt Torgerson	Lab ID:	827603
Sampled By:	K. Torgerson	Date Analyzed:	3/17/95
Client Sample ID:	#638 Run3	Dilution Factor:	2.44
Sampling Date:	3/3/95	Analysis Method:	TO-14
Sampling Time:	13:36	Report Revision No.:	0
Type:	Not given	Reported By:	B. Thompson
Matrix:	Air	Reviewed By:	K. Danford
		Units:	ppbv

Analyte	Sample Result	Qualifier
Butane	2.4	J
Acetic acid	2.5	J
2-Propanone	9.2	J
2-Propanol	1.5	J
Pentane	1.3	J
Hydrazine, 1,2-dimethyl-	2.3	J
Silanol, trimethyl-	3.8	J
1-Propanol, 2-methyl-	1.5	J
1-Hexanol	13	J
3-Heptanone	1.4	J
Cyclopropane, butyl-	1.6	J
2-Buten-1-ol	5.7	J
Butanoic acid, butyl ester	2.7	J
Ethene, 1-chloro-2-fluoro-	2.3	J
Benzene, 1-methyl-4-(1-methylethyl)-	2.8	J

J=Estimated value

Corvallis Applied Sciences Laboratory

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	03/07/95
Project Manager:	Kurt Torgerson	Lab ID:	8276
Sampled By:	K. Torgerson	Analytical Method:	GC-FID
Client Sample ID:	See chain of custody	Dilution Factor:	See below
Sampling Date:	See chain of custody	Report Revision No:	0
Sampling Time:	See chain of custody	Reported By:	K. Danford
Type:	Not given	Reviewed By:	B. Thompson
Matrix:	Air	Units:	µg/m3

Lab ID	Client ID	Reporting Limit	Dilution Factor	Methane Result	Qualifier	Analyzed
827601	#636 Run1	234	2.34	11200		3/22/95
827602	#551 Run2	240	2.40	9980		3/22/95
827603	#638 Run3	244	2.44	12000		3/22/95

J=Estimated value
U=Not detected at specified reporting limits

Corvallis Applied Sciences Laboratory

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	03/07/95
Project Manager:	Kurt Torgerson	Lab ID:	8276
Sampled By:	K. Torgerson	Analytical Method:	GC-FID
Client Sample ID:	See chain of custody	Dilution Factor:	See below
Sampling Date:	See chain of custody	Report Revision No:	0
Sampling Time:	See chain of custody	Reported By:	K. Danford
Type:	Not given	Reviewed By:	B. Thompson
Matrix:	Air	Units:	µg/m3

Lab ID	Client ID	Reporting Limit	Dilution Factor	Ethane Result	Qualifier	Analyzed
827601	#636 Run1	292	2.34	292	U	3/22/95
827602	#551 Run2	300	2.40	300	U	3/22/95
827603	#638 Run3	305	2.44	305	U	3/22/95

J=Estimated value
U=Not detected at specified reporting limits

Corvallis Applied Sciences Laboratory

Client Information		Lab Information	
Project Name:	Horizon Engineering	Date Rec'd:	03/07/95
Project Manager:	Kurt Torgerson	Lab ID:	8276
Sampled By:	K. Torgerson	Analytical Method:	TO-12
Client Sample ID:	See chain of custody	Dilution Factor:	5
Sampling Date:	See chain of custody	Report Revision No:	0
Sampling Time:	See chain of custody	Reported By:	G. Green
Type:	Not given	Reviewed By:	J. Bennett
Matrix:	Air	Units:	µg/m3

Lab ID	Client ID	Reporting Limit	Total Non-Methane Organic Carbon Result	Qualifier	Analyzed
827601	#636 Run1	250	4490		3/8/95
827602	#551 Run2	250	2450		3/8/95
827603	#638 Run3	250	5040		3/8/95

J=Estimated value
U=Not detected at specified reporting limits

CH2M HILL
APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project #:

Purchase Order #: 1234

Project Name: CSRM #456

Company Name/CH2M HILL Office: HORIZON ENGINEERING

Project Manager & Phone #: Mr. [✓] Ms. [ ] Dr. [ ] KURT TORGERSON 503-255-5050

Report Copy to: MIKE WALLACE

Requested Completion Date:

Sampling Requirements: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ____

Sample Disposal: Dispose ☐ Return ☐

LAB TEST CODES

SHADED AREA - FOR LAB USE ONLY

ANALYSES REQUESTED

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	TO-14 ANALYSIS BY GC/MS	10 T.I.C.'S (TOP 10)	TOTAL GASEOUS NON-METHANE ORGANICS	CH_4 + C_2 - C_6 CONC. IN PPM	REMARKS	LAB 1 ID	LAB 2 ID
3-3	1045					✓	#636 RUN1		✓	✓	✓	✓			
3-3	1202					✓	#551 RUN2		✓	✓	✓	✓			
3-3	1336						#638 RUN3		✓	✓	✓	✓			

Sampled By & Title (Please sign and print name): Kurt Torgerson KURT TORGERSON	Date/Time: 3-3-95	Relinquished By (Please sign and print name): Kurt D. Torgerson	Date/Time:
Received By (Please sign and print name):	Date/Time:	Relinquished By (Please sign and print name): J Sorensen J. SORENSEN	Date/Time: 3/6/95 10:15 am
Received By (Please sign and print name):	Date/Time:	Relinquished By (Please sign and print name):	Date/Time:
Received By (Please sign and print name):	Date/Time:	Shipped Via: UPS BUS Fed-Ex Hand Other	Shipping #:
Work Authorized By (Please sign and print name):	Remarks: NOTE: CANS ARE @ -7 to -8 in/Hg VACUUM. TOTAL VOC RANGE SHOULD BE ABOUT 30 ppm		

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

REV 3/94 FORM 340

Flow Rate Determination

Plant	Cascade Steel Rolling Mill	Pb=	29.65 in Hg	Testers	kdt/drb
Source	EAF Baghouse Inlet Duct	Cp=	0.81180	File	csrm0395
Date	03-Mar-95	Mag=	0-3A inH2O	Date	03-Mar-95

Sample Point	Run 1 12:20 dP	Tsi	dP	Tsi	Run 2 13:45 dP	Tsi	dP	Tsi
1	1.100	169.0			1.200	137.0		
2	1.300	166.0			1.300	138.0		
3	1.500	162.0			1.400	145.0		
4	1.600	162.0			1.600	150.0		
5	1.500	163.0			1.700	158.0		
6	1.600	168.0			1.800	166.0		
7	1.700	173.0			1.900	173.0		
8	1.800	172.0			1.900	173.0		
9	1.700	168.0			1.800	172.0		
10	1.700	167.0			1.800	171.0		
11	1.600	167.0			1.600	170.0		
12	1.300	167.0			1.400	169.0		
13	1.100	155.0			1.600	181.0		
14	1.500	159.0			1.800	186.0		
15	1.800	163.0			1.800	193.0		
16	1.900	165.0			1.800	200.0		
17	1.900	164.0			1.800	205.0		
18	1.900	159.0			1.700	207.0		
19	1.600	155.0			1.400	204.0		
20	1.700	155.0			1.500	197.0		
21	1.600	153.0			1.500	188.0		
22	1.700	152.0			1.500	178.0		
23	1.600	151.0			1.400	172.0		
24	1.300	149.0			1.300	162.0		
Ave sqrt(dP)	**1.2550** ✓	**161.8** ✓			**1.2639**	**174.8**		

Inlet Duct

Symbol	Definitions, Units		Method/Equation	Run 1	Run 2	Average
Dai	Duct diameter	in		138.5 ✓	138.5	
Asi	Cross Section	in²	pi(Da²)/4	15,066 ✓	15,066	
Tsi	Duct temperature	°F		161.8 ✓	174.8	168.3
Tdb	Dry bulb temp.	°F		135.9	142.8	139.4
Twb	Wet bulb temp.	°F		79.0	88.0	83.5
'Psi	Static Pressure	in H2O		-2.50	-2.40	-2.5
Tsi	Duct temperature	°R	Tsi + 459.67	621.5	634.5	628.0
Psi	Duct Pressure	in Hg	Pb + 'Psi/13.5955	29.47	29.47	29.47
S			sqrt(dP*Tsi)	31.29	31.84	31.56
mv	% H2O in gas stream			1.40	2.56	1.98
md	Mole fraction dry gas		1-(mv/100)	0.9860	0.9744	0.9802
Md	Molecular weight Dry		EPA 3a (Average)	29.02	29.02	29.02
Ms	Molecular weight Wet		mdMd + 18(1-md)	28.87	28.74	28.80
Vsi	Velocity stack	fpm	5129CpS sqrt(1/PsMs)	4,467	4,555	4,511
Qai	Flowrate actual	acf/m	VsiAsi/144	467,350	476,555	471,953
Qsi	Flowrate @std DRY	dscf/m	528Qai md Psi/29.92Tsi	385,291	380,397	382,844

Traverse Point Location

Client	Cascade Steel Rolling Mill		kdt/drb By
Location	EAF Baghouse Inlet Duct		csrm0395 File
Method	EPA 1		03-Mar-95 Date
Outer Circumference	Co ft		
Wall thickness	t in		
Inner Circumference	Ci ft		
INSIDE of FAR WALL to OUTSIDE of Nipple	F in	138.75	
INSIDE of NEAR WALL to OUTSIDE of Nipple	N in	0.25	
STACK WALL to to OUTSIDE of Nipple	N-t in		
DOWNstream Disturb	A in	500.0	
UPstream Disturb	B in	516.0	
Inner Diameter	Ds in	138.50	
Area	As sqin	15,065.7	
DOWNstream Ratio	A/Ds	3.61	
UPstream Ratio	B/Ds	3.73	
Traverse (Particulate)		24	
Recommended #Pts/Diameter		12	
Traverse (NON-Particulate)		16	
Recommended #Pts/Diameter		8	
Actual Points per Diameter		12	

Trav Pt #No	Fract Stk ID (f)	Stack ID (Ds)	Actual Points (Dsxf)	Nearest 8ths (TP)	Adjusted Points (TP)*	Traverse Points (TP + N)	Traverse Points (TP + N)			
1	2.13%	138.5	2.9	3.000	3.000	3.250	3	1	/	4
2	6.70%	138.5	9.3	9.250	9.250	9.500	9	1	/	2
3	11.81%	138.5	16.4	16.375	16.375	16.625	16	5	/	8
4	17.73%	138.5	24.5	24.500	24.500	24.750	24	3	/	4
5	25.00%	138.5	34.6	34.625	34.625	34.875	34	7	/	8
6	35.57%	138.5	49.3	49.250	49.250	49.500	49	1	/	2
7	64.43%	138.5	89.2	89.250	89.250	89.500	89	1	/	2
8	75.00%	138.5	103.9	103.875	103.875	104.125	104	1	/	8
9	82.27%	138.5	114.0	114.000	114.000	114.250	114	1	/	4
10	88.19%	138.5	122.1	122.125	122.125	122.375	122	3	/	8
11	93.30%	138.5	129.2	129.250	129.250	129.500	129	1	/	2
12	97.87%	138.5	135.6	135.500	135.500	135.750	135	3	/	4

Date 20-FEB-95	Pb= 30.25 in Hg	drb
File pt295	Ta= 520.0 R	
Method #2 sec 4	Location Whitaker Shop	

Pitot	Tested Last	[Cp] New	[S]	[Cp] Old	[%] Change
gs3-1	21-Feb-95	0.78404	0.00312	[redacted]	[redacted]
ss3-2	21-Feb-95	0.79422	0.00580	[redacted]	[redacted]
ss3-3	21-Feb-95	0.79464	0.00626	[redacted]	[redacted]
gs5-1	21-Feb-95	0.81894	0.00412	[redacted]	[redacted]
ss5-2	21-Feb-95	0.79536	0.00566	[redacted]	[redacted]
ss5-3	21-Feb-95	0.78481	0.00362	0.80429	[redacted]
gs5-4	21-Feb-95	0.78763	0.00500	[redacted]	[redacted]
ss5-5	21-Feb-95	0.79218	0.00780	[redacted]	[redacted]
sp6-1	21-Feb-95	0.84842	0.00545	[redacted]	[redacted]
5-s	21-Feb-95	0.83098	0.00447	[redacted]	[redacted]
ht1	21-Feb-95	0.80122	0.00928	[redacted]	[redacted]
	Average	0.73604	0.00505	[redacted]	[redacted]

Pitot	Tested Last	[Cp] New	[S]	[Cp] Old	[%] Change
ss7-1	9-Aug-94	0.80390	0.00665	[redacted]	[redacted]
ss7-2	21-Feb-95	0.80292	0.00600	[redacted]	[redacted]
ss7-3	21-Feb-95	0.80729	0.00709	[redacted]	[redacted]
ss10-1	21-Feb-95	0.79620	0.00983	[redacted]	[redacted]
ss10-2	21-Feb-95	0.77734	0.00707	[redacted]	[redacted]
ss10-3	21-Feb-95	0.80522	0.00677	[redacted]	[redacted]
11-s	21-Feb-95	0.81180	0.00764	[redacted]	[redacted]
10-s	21-Feb-95	0.79918	0.00341	[redacted]	[redacted]
pA-1	21-Feb-95	0.81527	0.00312	[redacted]	[redacted]
3-s	21-Feb-95	0.83259	0.00493	[redacted]	[redacted]
wc4-1	21-Feb-95	0.82428	0.00855	[redacted]	[redacted]
wc8-1	21-Feb-95	0.81999	0.00694	[redacted]	[redacted]
	Average	0.80691	0.00646	[redacted]	[redacted]

Pitot	dPp	dPs	Cp	dS	Avg Cp	S
gs3-1	1.300	2.060	0.78645	0.00241	0.78404	0.00312
	0.838	1.350	0.77999	0.00405		
	0.474	0.760	0.78184	0.00220		
	0.285	0.450	0.78786	0.00382		
ss3-2	1.380	2.100	0.80254	0.00832	0.79422	0.00580
	0.870	1.380	0.78606	0.00816		
	0.520	0.815	0.79078	0.00344		
	0.305	0.470	0.79751	0.00329		
ss3-3	1.370	2.120	0.79584	0.00120	0.79464	0.00626
	0.905	1.450	0.78212	0.01252		
	0.565	0.860	0.80244	0.00779		
	0.325	0.500	0.79816	0.00352		
gs5-1	1.340	1.980	0.81443	0.00450	0.81894	0.00412
	0.895	1.320	0.81519	0.00374		
	0.510	0.740	0.82187	0.00294		
	0.305	0.440	0.82425	0.00531		
ss5-2	1.325	2.090	0.78826	0.00710	0.79536	0.00566
	0.843	1.320	0.79116	0.00421		
	0.455	0.700	0.79816	0.00280		
	0.300	0.455	0.80388	0.00851		
ss5-3	1.360	2.130	0.79107	0.00626	0.78481	0.00362
	0.865	1.380	0.78380	0.00101		
	0.535	0.865	0.77858	0.00623		
	0.315	0.500	0.78579	0.00098		
gs5-4	1.350	2.100	0.79377	0.00614	0.78763	0.00500
	0.871	1.380	0.78651	0.00112		
	0.495	0.800	0.77874	0.00889		
	0.310	0.485	0.79149	0.00386		
ss5-5	1.350	2.100	0.79377	0.00158	0.79218	0.00780
	0.905	1.430	0.78757	0.00461		
	0.495	0.795	0.78119	0.01100		
	0.315	0.475	0.80620	0.01402		
sp6-1	1.425	1.975	0.84093	0.00749	0.84842	0.00545
	1.175	1.600	0.84839	0.00003		
	0.765	1.050	0.84503	0.00339		
	0.330	0.438	0.85932	0.01090		
5-s	1.310	1.820	0.83992	0.00893	0.83098	0.00447
	0.865	1.230	0.83022	0.00077		
	0.525	0.760	0.82283	0.00816		
	0.310	0.440	0.83098	0.00001		
ht1	1.400	2.100	0.80833	0.00712	0.80122	0.00928
	0.960	1.450	0.80554	0.00432		
	0.525	0.840	0.78266	0.01855		
	0.320	0.480	0.80833	0.00712		

CSRM 3/3/95

Pitot	dPp	dPs	Cp	dS	Avg Cp	S
ss7-1	1.375	2.050	0.81079	0.00690	0.80390	0.00665
	0.885	1.350	0.80157	0.00233		
	0.510	0.795	0.79293	0.01096		
	0.345	0.515	0.81029	0.00640		
ss7-2	1.380	2.100	0.80254	0.00039	0.80292	0.00600
	1.150	1.710	0.81187	0.00894		
	0.690	1.080	0.79131	0.01161		
	0.285	0.430	0.80598	0.00305		
ss7-3	1.375	2.100	0.80108	0.00620	0.80729	0.00709
	0.880	1.350	0.79930	0.00799		
	0.530	0.792	0.80986	0.00258		
	0.325	0.475	0.81890	0.01161		
ss10-1	1.350	2.060	0.80144	0.00524	0.79620	0.00983
	0.855	1.380	0.77925	0.01694		
	0.485	0.755	0.79347	0.00272		
	0.295	0.440	0.81063	0.01443		
ss10-2	1.350	2.150	0.78448	0.00714	0.77734	0.00707
	0.810	1.340	0.76971	0.00763		
	0.485	0.800	0.77083	0.00650		
	0.295	0.470	0.78433	0.00699		
ss10-3	1.350	2.000	0.81337	0.00815	0.80522	0.00677
	0.870	1.320	0.80373	0.00150		
	0.475	0.740	0.79317	0.01205		
	0.295	0.440	0.81063	0.00540		
11-s	1.320	1.970	0.81038	0.00142	0.81180	0.00764
	0.825	1.270	0.79792	0.01387		
	0.485	0.721	0.81197	0.00017		
	0.300	0.430	0.82692	0.01512		
10-s	1.350	2.050	0.80339	0.00421	0.79918	0.00341
	0.815	1.260	0.79621	0.00297		
	0.455	0.705	0.79533	0.00385		
	0.305	0.465	0.80179	0.00261		
pA-1	1.360	2.000	0.81638	0.00110	0.81527	0.00312
	0.890	1.320	0.81291	0.00236		
	0.487	0.725	0.81139	0.00388		
	0.285	0.415	0.82042	0.00514		
3-s	1.375	1.950	0.83132	0.00127	0.83259	0.00493
	1.175	1.675	0.82918	0.00341		
	0.695	0.995	0.82740	0.00519		
	0.315	0.435	0.84245	0.00987		
wc4-1	1.350	1.980	0.81747	0.00682	0.82428	0.00855
	0.885	1.270	0.82643	0.00215		
	0.480	0.710	0.81400	0.01028		
	0.309	0.430	0.83923	0.01495		
wc8-1	1.330	1.963	0.81500	0.00499	0.81999	0.00694
	0.900	1.300	0.82373	0.00374		
	0.490	0.730	0.81110	0.00890		
	0.315	0.448	0.83014	0.01015		

Thermocouple Calibration

Date:	21-Feb-95	Deviation	@32 F	7.4	Pb=	30.25 in Hg			DRB		
Next Calibration:	20-Aug-95	Limit	@212 F	10.1	Ta=	55.0 oF			950221TC		
			@400 F	12.9							

		Ice, water			Boiling, Water			Boiling, Oil			Average
	Probe/ID	Measured, F	Standard, F	Difference F	Measured, F	Standard, F	Difference F	Measured, F	Standard, F	Deviation, %	Difference F
Probe	10-1	32.2	32.2	0.0	212.0	211.8	0.2	368.2	370.8	-2.6	-0.80
Probe	10-2	31.8	32.0	-0.2	212.8	211.8	1.0	369.0	370.8	-1.8	-0.33
Probe	10-3	31.8	32.0	-0.2	213.0	211.6	1.4	361.0	360.8	0.2	0.47
Probe	3-1	31.8	32.0	-0.2	212.2	211.4	0.8	366.6	367.2	-0.6	0.00
Probe	3-2	33.4	33.4	0.0	213.0	212.0	1.0	374.2	383.0	-8.8	-2.60
Probe	3-3	32.2	32.0	0.2	213.4	212.4	1.0	362.8	366.6	-3.8	-0.87
Probe	5-1	32.0	32.0	0.0	212.2	211.2	1.0	373.8	372.0	1.8	0.93
Probe	5-2	31.4	32.0	-0.6	212.6	211.2	1.4	371.0	371.2	-0.2	0.20
Probe	5-3	31.6	32.0	-0.4	213.4	211.4	2.0	373.8	373.6	0.2	0.60
Probe	5-4	32.0	32.2	-0.2	212.0	211.6	0.4	369.4	371.8	-2.4	-0.73
Probe	5-5	31.6	32.0	-0.4	213.0	211.8	1.2	369.2	371.6	-2.4	-0.53
Probe	7-1	32.0	32.0	0.0	211.8	211.4	0.4	372.2	375.2	-3.0	-0.87
Probe	7-2	31.8	32.0	-0.2	213.0	211.6	1.4	370.4	370.8	-0.4	0.27
Probe	7-3	31.2	32.2	-1.0	213.2	211.6	1.6	372.0	373.2	-1.2	-0.20
Free Standing Pitot	11-S	33.0	33.6	-0.6	214.6	212.0	2.6	390.4	387.2	3.2	1.73
	10-S	31.6	32.0	-0.4	213.6	212.0	1.6	363.4	366.6	-3.2	-0.67
											0.00
	F01	31.6	32.4	-0.8	212.0	211.6	0.4	368.4	370.2	-1.8	-0.73
											0.00
	F4	31.6	32.4	-0.8	212.4	211.0	1.4	364.2	365.4	-1.2	-0.20
	F23	31.2	32.4	-1.2	212.8	212.0	0.8	367.6	368.8	-1.2	-0.53
	F25	31.2	32.4	-1.2	213.2	211.8	1.4	366.4	370.4	-4.0	-1.27
	F26	31.6	32.4	-0.8	212.4	211.6	0.8	368.8	369.8	-1.0	-0.33
	F30	31.4	32	-0.6	213.4	212.6	0.8	378.6	378.4	0.2	0.13
	F31	31.2	32	-0.8	214.0	212.6	1.4	377.2	377.0	0.2	0.53
	F40	31.6	32	-0.4	212.6	211.8	0.8	363.0	362.2	0.8	0.27
	F51	31.8	32	-0.2	213.4	212.2	1.2	367.6	367.6	0.0	0.07
	F52	32.1	32	0.1	213.2	212	1.2	364.4	365.4	-1.0	-0.13
	F81	31.2	32.0	-0.8	212.2	211.2	1.0	379.6	379.2	0.4	0.07
	F82	31.6	32.0	-0.4	212.6	211.6	1.0	361.2	359.2	2.0	0.87
	F83	31.4	32.2	-0.8	212.4	211.8	0.6	379.2	382.2	-3.0	-0.78
Water Cooled Probe	*Magnum*	31.8	32.0	-0.2	212.6	211.8	0.8	367.2	371.2	-4.0	-1.33
AVERAGE		30.73	31.15	-0.42	212.83	211.75	1.09	370.12	371.32	-1.19	-0.21
				-0.09%			0.16%			-0.14%	
Hivol Dial Gauges	Range										
1032					211.0	212.6	-1.6	280.0	283.2	-3.2	-2.40
1192	50-500				210.0	211.8	-1.8	284.0	290.2	-6.2	-4.00
7777					208.0	212.0	-4.0	263.0	270.0	-7.0	
D-1											
D-2					212.0	212.0	0.0	310.0	313.6	-3.6	-1.80
D-3											
D-4					210.0	211.2	-1.2	320.0	318.2	1.8	0.30
D-5											
D-6		36.0	38.2	-2.2	211.0	212.4	-1.4				-0.70
D-7		36.0	38.0	-2.0	128.0	126.0	2.0				1.00
D-8		34.0	33.6	0.4	114.0	116.4	-2.4				-1.20
D-9					214.0	212.2	1.8	321.0	321.6	-0.6	0.60
Standard Used	Fluke 5895570										

Thermocouple Indicator Calibration

Date:	23-Mar-95	Deviation	@32 F	7.4	Pb=	30.25 in Hg		DRB
Next Calibration:	19-Sep-95	Limit	@212 F	10.1	Ta=	55.0 oF		TCINDIC.WB1
			@400 F	12.9				

Thermocouple Indicator	Channel	Measured, F	Standard, F	Difference F	Measured, F	Standard, F	Difference F	Measured, F	Standard, F	Deviation, %	Average Difference F
Dial multi-indicator	1	38	36.8	1.2	208	206.6	1.4	409	408.0	1.0	1.20
	2	34	32.2	1.8	202	200.8	1.2	409	407.8	1.2	1.40
	3	35	32.0	3.0	218	216.6	1.4	405	403.2	1.8	2.07
	4	32	29.8	2.2	212	209.6	2.4	405	403.0	2.0	2.20
	5	32	29.4	2.6	207	205.2	1.8	425	423.4	1.6	2.00
Omega trendicator	1	17	17.2	-0.2	488	488.0	0.0	831	830.6	0.4	0.07
	2	17	17.2	-0.2	257	257.2	-0.2	477	476.6	0.4	-0.00
	3	33	32.6	0.4	207	206.6	0.4	476	475.8	0.2	0.33
	4	33	32.6	0.4	216	215.6	0.4	581	580.6	0.4	0.40
	5	33	32.4	0.6	198	198.0	0.0	581	580.0	0.2	0.27
single Omega ind.		104	103.8	0.2	162	166.4	-4.4	592	595.0	-3.0	-2.40
CAE meter box	1	32	35.0	-3.0	233	231.0	2.0	702	701.4	0.6	-0.13
	2	29	28.6	0.4	230	228.8	1.2	718	717.6	0.4	0.67
	3	7	5.0	2.0	218	216.6	1.4	718	717.6	0.4	1.27
	4	31	31.6	-0.6	205	204.2	0.8	710	709.6	0.4	0.20
	5	31	30.2	0.8	230	228.8	1.2	673	672.8	0.2	0.73
temp. control box #1	1	223	221.4	1.6	634	634.8	-0.8	1703	1703	0.0	0.27
	2	212	210.4	1.6	409	408.6	0.4	1140	1140.0	0.0	0.67
	3	6	2.0	4.0	211	210.2	0.8	533	534.0	-1.0	1.27
	4	10	3.6	6.4	141	137.6	3.4	516	516.8	-0.8	3.00
	5	8	2.6	5.4	176	173.2	2.8	517	517.6	-0.6	2.53
	6	10	4.8	5.2	230	227.4	2.6	643	642.4	0.6	2.80
temp. control box #2	1	6	2.0	4.0	168	165.4	2.6	645	644.2	0.8	2.47
	2	4	0.8	3.2	198	198.8	-0.8	788	787.4	0.6	1.00
	3	35	35.2	-0.2	252	249.4	2.6	876	876.8	-0.8	1.93
	4	41	38.8	2.2	214	211.2	2.8	830	830.6	-0.6	2.87
	5	40	38.2	1.8	218	216.4	1.6	829	829.2	-0.2	-1.47
	6	36	34.2	1.8	245	243.6	1.4	828	829.0	-1.0	0.13
single chanel c.b.		104	103.8	0.2	162	166.4	-4.4	592	595.0	-3.0	-1.00
Fluke # 4135358		30.0	29.2	0.8	388.4	387.8	0.6	880.0	880.8	-0.8	-0.27
AVERAGE		43.43	41.78	1.65	244.58	243.69	0.89	681.07	681.02	0.05	0.88
				0.33%			0.13%			0.00%	

Magnehelic Calibrations

21-Feb-95 Date
BTF/DMA Testers
Whitaker Shop Location

950221mg File
Ta(F)
Pb(in Hg)
Box #3 Manometer

Magnehelic ID	Leak High	(15 s) Low	Scale	Magnehelic in H2O	Manometer in H2O	Difference in H2O	Difference %	Difference Average	5% Pass Criteria
10-C	OK	OK	10.00	0.00	0.00	0.00	0.0%	1.0%	Pass
				0.90	0.91	0.01	0.1%		
				4.70	4.90	0.20	2.0%		
				9.00	9.20	0.20	2.0%		
1-A	OK	OK	1.00	0.00	0.00	0.00	0.0%	4.3%	Pass
				0.50	0.55	0.05	5.0%		
				0.86	0.93	0.07	7.0%		
				1.00	1.05	0.05	5.0%		
1-E	OK	OK	1.00	0.00	0.00	0.00	0.0%	2.2%	Pass
				0.80	0.86	0.05	5.5%		
				0.44	0.48	0.04	4.0%		
				0.10	0.09	-0.01	-0.5%		
1-D	OK	OK	1.00	0.00	0.00	0.00	0.0%	-0.5%	Pass
				0.97	0.96	-0.01	-1.0%		
				0.39	0.38	-0.01	-1.0%		
				0.20	0.20	0.00	0.0%		
2-A	OK	OK	2.00	0.00	0.00	0.00	0.0%	0.0%	Pass
				0.31	0.31	0.00	0.0%		
				1.15	1.15	0.00	0.0%		
				1.80	1.80	0.00	0.0%		
3-A	OK	OK	3.00	0.00	0.00	0.00	0.0%	0.2%	Pass
				2.70	2.70	0.00	0.0%		
				1.55	1.55	0.00	0.0%		
				0.65	0.67	0.02	0.7%		
4-A	OK	OK	4.00	0.00	0.00	0.00	0.0%	0.3%	Pass
				3.80	3.80	0.00	0.0%		
				2.25	2.25	0.00	0.0%		
				0.40	0.45	0.05	1.2%		
4-B	OK	OK	4.00	0.00	0.00	0.00	0.0%	0.1%	Pass
				3.90	3.90	0.00	0.0%		
				2.30	2.30	0.00	0.0%		
				0.70	0.71	0.01	0.3%		
10-A	OK	OK	10.00	0.00	0.00	0.00	0.0%	0.5%	Pass
				9.50	9.50	0.00	0.0%		
				6.00	6.10	0.10	1.0%		
				1.80	1.90	0.10	1.0%		
50-A	OK	OK	50.00	46.00	47.00	1.00	2.0%	1.2%	Pass
				28.00	29.00	1.00	2.0%		
				15.00	16.00	1.00	2.0%		
				0.00	0.00	0.00	0.0%		
100-A	OK	OK	100.00	68.00	69.00	1.00	1.0%	0.0%	Pass
				39.00	38.00	-1.00	-1.0%		
				11.00	11.00	0.00	0.0%		
				0.00	0.00	0.00	0.0%		

.25-A **see additional pages for calibration of .25" magnehelic

CASCADE STEEL-STEEL PRODUCTION

DAY Fri. DATE 3-3-95

	FINAL CHEMISTRY								EBT FURNACE									LADLE REFINING STATION							MAJOR DELAYS	
SEQ	HEAT NUMBER	GRADE	C	MN	P	S	SI	CR	CHG TIME	TAP TIME	TAP TAP	TAP TEMP	CHG WTS	TAP WTS	KWHX 1000	OXY NMS	DELTA X-HTS	ARRV TEMP	ARRV TIME	EXIT TIME	EXIT TEMP	AR/N2 STIR	KWHX 1000	LADLE X-HTS	DELAY MINS	REASON
1	0908	5/A706	23	1.15	008	022	221	0017	23:34	1:14	1:50	2950	110	90	44300	48940	32	1885	1:17	1:52	2896	AR	2500	1-44	40min	lost city power
2	0909	3/60	36	1.14	012	024	215	0012	1:24	2:38	1:14	2921	116	95	48000	20000	33	2879	2:44	3:12	2892	AR	3000	4-46	7min	Booster fan fault
3	0910	5/A706	23	1.20	011	018	208	0016	2:45	3:50	1:12	2925	113	95A	45800	42480	34	2888	3:55	4:23	2925	AR	3500	3-1		
4	0911	5/A706	24	1.14	009	013	219	0014	4:00	5:05	1:15	2940	112	92	45000	30000	35	2841	5:10	5:40	2902	AR	3750	6-45	?	wait for [illegible]
5	0912	5/A706	25	1.22	013	028	239	0012	5:14	6:28	1:13	2933	113	94	44000	29580	36	2820	6:30	7:00	2864	Ar	4000	4-47	5min.	Add "A" phase
6	0913	5/A706	26	1.11	012	027	205	0011	6:30	7:46	1:18	2875	112	95	46000	40000	37	2865	7:48	8:20	2880	Ar	3150	3-2	11 min.	wait for charge bucket
7	0914	5/A706	24	1.12	021	028	209	0012	7:51	9:09	1:23	2850	118	96	49000	39400	38	2886	9:11	9:34	2894	Ar	2300	6-46		
8	0915	5/A706	26	1.07	011	026	197	0008	9:22	10:38	1:29	2885	114	92	45000	37000	39	2835	10:40	11:09	2850	Ar	3500	4-48	11 min. 2 min.	wait for charge Crane
9	0916	1020	42	1.02	012	023	221	0023	10:42	12:04	1:26	2934	111	94	48000	45360	40	2819	12:06	12:31	2873	Ar	3350	3-3	7min.	Add "A" phase-clamp came apart Add a[illegible]
10	0917	M1015	14	53	009	016	184	0012	12:10	13:18	1:14	2957	116	92	43000	32600	41	2859	13:20	14:31	2928	Ar	5500	6-47	20 min.	wait on caster [illegible]
11	0918	M1015	13	54	014	023	153	0008	13:35	14:54	1:36	2931	111	94	44000	41040	42	2902	14:58	15:41	2931	Ar	5070	4-49	4 min. 5 min	Crane Add "C" phase
12	0919	529/50	13	1.14	017	015	178	0016	15:03	16:05	1:11	2998	112	95	45200	36740	43	2891	16:05	17:06	2916	Ar	4460	3-4		
13	0920	529/50	14	1.16	011	015	208	0012	16:11	17:18	1:13	2950	107	91	42200	51140	44	2889	17:22	18:35	2918	Ar	3720	6-48	5 min 5 min	wait for charge Add "B" phase
14	0921	A36	14	70	013	019	199	0015	17:28	18:52	1:34	3002	119	85	47600	46870	45	2921	18:54	19:41	2915	AR	2430	4-50	5 min 9min	O.C. Hash high O2
15	0922	A36	16	72	013	024	230	0007	18:51	19:58	1:06	2929	112	95	44000	69550	46	2857	20:04	20:52	2915	AR	2450	3-5		
16	0923	A36	13	68	012	019	179	0015	20:08	21:13	1:15	2967	113	93	43000	79420	47	2890	21:17	22:02	2917	AR	2480	6-49	9min	High O2
17	0924	A36	14	72	015	022	197	0016	21:21	22:20	1:07	3000	110	94	43200	72060	48	2881	22:23	23:14	2912	AR	2850	4-51		
18	0925	A36	14	69	010	018	175	0018	22:28	23:25	1:15	2925	115	99	43700	42430	49	2854	23:35	0:38	2906	AR	4500	3-6	5min	Add "C" in base
19																										
20																										
21																										
22													2034	1678	811000								63710			

SHOP	FURNACE		CASTER		BILLET			ENERGY				HOLD HOURS ON EACH LINE				
PERFORMANCE	CHARGE TONS	TAP TONS	CAST TONS	REPOUR TONS	BILLETS	SAVES	SCRAP FEET	EAF	LMF	TOTAL	KWH/TON	#1	#2	#3	#4	#5
DAILY TOTAL	2034	1678	1827	—	1421	21	—	811000	63710	874710	479					
PREVIOUS TOTAL	1616		2385	—	1891	10	40	XXXXXX	XXXXXX							
MONTH TO DATE	4650		4212	—	3312	31	40	XXXXXX	XXXXXX			8	1165	158	193	40[illegible]

SUMMA CANS

RUN #1 CAN = #636 — STOPPED @ 1056 — BROKEN ELECTRODE (9:32 INTO TEST) — VAC = 26½" — RESTART @ 1110 — (56 MINS)

START TIME = 1045 END TIME = 1201

START VACUUM = -30"/Hg END VACUUM = -7.0 IN/Hg

RUN #2 CAN = # 551 = (65.5 MINS)

START TIME = 1202-1207 RESTART @ 1210 END TIME = 1315

START VACUUM = -30"/Hg END VACUUM = -7.0

RUN #3 CAN = #638 STOP @ 1412 (35.15 MINS) DUE TO FURNACE OFF VAC = 17

START = 1336 HRS RESTART @ 1427 HRS. END TIME = 1455 (63.0 MINS)

START VACUUM = -28"/Hg END VACUUM = -8

CSRM March 3, 1995 Baghouse

1st charge 1053

3rd Charge 11:31

end 3rd charge 12:04 - Tapping

4th charge 1214

5th charge 12.28

6th charge 12:45 end at 1315

*7th charge 13:40

8th charge 1350

9th charge 1404

end 1457

* Cleaned Baghouse Comp. #12 for 1 min while they were gunning refractory.

1042	1210	1335
1204	1318	1454

W

~~1050~~

1053 (43)	1214 (1015)	1340 (2047)
1204 (895)	1315 (1747)	1457

(5)	(967)	(1987)
(895)	(1783)	(2934)

Horizon Engineering

13585 N.E. Whitaker Way
Portland, Oregon 97230
503/255-5050 FAX# 503/255-0505

February 28, 1995

Mr. Daniel Lee
Cascade Steel Rolling Mills
3200 North Highway 99 West
McMinnville, Oregon 97128

Re: March EAF source testing

Dear Daniel:

To assist you in determining your Title V emission inventory, I propose the following source test plan for the electric arc furnace baghouse.

1. Source to be Tested: Electric Arc Furnace (EAF) Baghouse.

2. Source Description: 12 compartment baghouse controlling particulate emissions from the EAF

3. Pollutants to be Tested: EAF: Nitrogen Oxides (NOx), Total Gaseous Organic Compounds (TGOC's), and Carbon Monoxide (CO)

4. Test Methods to be Used:
   -NOx EPA Method 7E
   -TGOC EPA Method 25A and Summa Canisters. The Summa canisters will be analyzed for total gaseous non-methane organic compounds on the TO-14 list by CH2M Hill. Results of this analysis will be reported as total carbon.
   -CO:EPA Method 10 (no Ascarite trap)
   -Moisture: DEQ Method 4 (wet/dry bulb thermometry)
   -Flowrate: EPA Method 2
   -CO2 and O2: EPA Method 3A (for Molecular Weight)
   + SO_2 – GC.

5. Number of Sampling Replicates: Three (3): each test run shall be a minimum of one hour long during a complete heat cycle. Flow measurements shall be made before the first and after the third gas test run. The Summa canisters will run for approximately one hour, concurrent with the instrumental gas analysis.

6. Source Testing Personnel Contact: David R. Rossman
   or

Kurt D. Torgerson
Telephone: 255-5050
Fax: 255-0505

7. Source Site Personnel Contact: Daniel Lee
Telephone: (503) 434-3324

8. Applicable Process/Production Information: Heat charge weights and materials, tap weights and materials, heat times.

9. Fuel samples to be collected by: N/A

10. Fuel analysis to be performed by: N/A

11. Opacity readings to be taken by: N/A

12. EAF duct air flow measuring location meets criteria in ODEQ Methods 1 and 2. Checks for cyclonic flow at this location have been made in the past with acceptable results.

Any questions relating to the test plan should be directed to me at 255-5050.

Sincerely,

Kurt D. Torgerson

Kurt D. Torgerson
Horizon Engineering