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Title/Desc:
USBM PHASE 1 HANFORD LLW MELTER TESTS MELTER OFFGAS REPORT

OCT 30 1995 (21) ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT № 611887

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Waste Product Technology	4. Related EDT No.: 611886
5. Proj./Prog./Dept./Div.: TWRS LLW Program	6. Cog. Engr.: W. C. Eaton (509)376-9541	7. Purchase Order No.: MMI-SVV-384216
8. Originator Remarks: U.S. Bureau of Mines Phase 1 melter test offgas report		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-VI-032		0	U.S. Bureau of Mines, Phase 1 Hanford Low-Level Waste Melter Tests: Melter Offgas Report	Q	1,2	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng. W. C. Eaton			H5-27	C. N. Wilson		10/19/95	H5-27	1	1
1	1	Cog. Mgr. D. W. Washenfelder		10/19/95	H5-27						
1	1	QA D. W. Duncan		10/19/95	B4-55						
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W. C. Eaton 10/19/95 Signature of EDT Originator Date	Authorized Representative for Receiving Organization Date	D. W. Washenfelder 10/19/95 Cognizant Manager Date	Ctrl. No. [1] Approved [2] Approved w/comments [3] Disapproved w/comments

BD-7400-172-2 (04/94) GEF097

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Document Number:	WHC-SD-WM-VI-032, Rev. 0
Document Title:	U.S. Bureau of Mines, Phase 1 Hanford Low-Level Waste Melter Tests: Melter Offgas Report
Release Date:	10/27/95

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SUPPORTING DOCUMENT

1. Total Pages 232

2. Title

U.S. Bureau of Mines, Phase 1 Hanford Low-Level Waste Melter Tests: Melter Offgas Report

3. Number

WHC-SD-WM-VI-032

4. Rev No.

0

5. Key Words

Low-level waste, vitrification, glass, melter, testing, demonstration, offgas, Hanford, tank waste

6. Author

Name: W. C. Eaton

Signature

Organization/Charge Code 73510/D42AN

7. Abstract

A multiphase program was initiated in 1994 to test commercially available melter technologies for the vitrification of the low-level waste (LLW) stream from defense wastes stored in underground tanks at the Hanford Site in southeastern Washington State. Phase 1 of the melter demonstration tests using simulated LLW was completed during fiscal year 1995. This document is the melter offgas report on testing performed by the U.S. Department of the Interior, Bureau of Mines, Albany Research Center in Albany, Oregon. The Bureau of Mines (one of the seven vendors selected) was chosen to demonstrate carbon electrode melter technology (also called carbon arc or electric arc) under WHC subcontract number MMI-SVV-384216. The document contains the complete offgas report for the first 24-hour melter test (WHC-1) as prepared by Entropy Inc. A summary of this report is also contained in the "U. S. Bureau of Mines, Phase 1 Hanford Low-Level Waste Melter Tests: Final Report" (WHC-SD-WM-VI-030).

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SOURCE EMISSIONS TEST REPORT

HANFORD FEED

ELECTRIC ARC MELTER

Source Location:

US Bureau of Mines
Albany Research Center
1450 Queen Avenue, SW
Albany, Oregon 97321

Test Date: March 8 through 10, 1995
Issue Date: May 31, 1995
Revision: 1

Prepared for:

Lockheed Idaho Technologies Company
1955 Fremont Avenue
Idaho Falls, Idaho 83415

Prepared by:

Entropy, Inc.
EI No.: 13911 A

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Prepared By: Sakhalin Finnie — Sakhalin Finnie, Report Writer

Reviewed By: _____ — Shawn Graham, Project Manager

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1.0 SUMMARY

1.1 Source Information

Plant Name and Address:	U.S. Bureau of Mines Albany Research Center 1450 Queen Avenue, SW Albany, Oregon 97321
Source Tested:	Electric Arc Melter
Plant Contact:	Larry Oden
Phone Number:	(503) 967 - 5862

1.2 Testing Firm Information

Firm Name and Address:	Entropy, Inc. 5932 Bolsa Avenue, Suite 105 Huntington Beach, CA 92649
Firm Contact:	Shawn Graham
Phone Number:	(714) 373-0998 Ext. 27
Subcontractor:	Quanterra Environmental Services

1.3 Test Information

Test Requested By:	Lockheed Idaho Technologies Company (LITCO)
Firm Contact:	Nick Soelberg
Phone Number:	(208) 526 - 6923
Test Objective:	To obtain emissions measurements to evaluate and understand melter system performance on surrogate waste materials.
Test Methods:	EPA 3A O_2 and CO_2 EPA 5 Type Particulate, Metals, NH_3, HCl, Cl_2, HF and F_2 EPA 6C SO_2 EPA 7E NO_x EPA 10 CO EPA 25A Total Hydrocarbons (THC)
Test Date:	March 8 through 10, 1995

1.4 Test Personnel

Test Coordinator:	Nick Soelberg

Test Observers:	Larry Oden, USBM Bill O'Conner, USBM Paul Turner, USBM Lynn Ball, LITCO
Entropy Test Personnel:	Shawn Graham, Project Manager Hung Duong, Project Supervisor Eric Swope, Team Leader

2.0 TEST RESULTS AND DATA PRESENTATION

The result of the ammonia test run from the continuous emissions monitoring (CEM) conditioning system is presented in Table 2-1. The results of the particulate, metals, NH_3, HCl, Cl_2, HF and F_2 emissions testing are summarized in Table 2-2. The results of the O_2, CO_2, SO_2, NO_x, CO and THC testing are summarized in Table 2-3. The temperature and pressure measurements obtained from the EPA Method 2 sample traverses are presented in Tables 2-4 and 2-5, respectively.

Detailed field data and results tabulations are presented in Appendix A. Example calculations are given in Appendix B. Field data are given in Appendix C. Analytical data are provided in Appendix D. Calibration data are presented in Appendix E. Sampling train schematics are presented in Appendix F. Process schematics are presented in Appendix G.

TABLE 2-1
AMMONIA TEST RESULTS
(FROM CEM CONDITIONING SYSTEM)

PARAMETER	DATE	RUN TIME	TEST LOCATION	FEED	CATCH WEIGHT (mg)	VOLUME SAMPLED (acf)	CONCENTRATION (ppmvd)
Ammonia	March 9, 1995	1454-1622	In-Furnace	B & Idle	15.9	33.2	23.9

TABLE 2-2

EMISSIONS TEST RESULTS

PARAMETER	UNITS	TEST RUN 2 HANFORD B FURNACE OUTLET	TEST RUN 3 HANFORD B FURNACE OUTLET	TEST RUN 4 IDLE FURNACE OUTLET	TEST RUN 5 HANFORD A FURNACE OUTLET	TEST RUN 6 HANFORD A CYCLONE INLET
Run Time	minutes	1110-1138	1253-1329	1628-1708	2101-2151	2350-0035
Temperature	°F	981	981		1670	645
Velocity	ft/s	14.5	14.5		4.7	12.5
Volumetric Flow Rate	scfm	104.8	104.4		14.9	223
Particulate	gr/dscf	28.4	23.5	0.0178	147	16.9
	lb/hr	25.5	21.0		18.8	32.4
Aluminum	mg/dscf	2.84	2.52	0.00849	20.5	1.53
	lb/hr	0.0393	0.0348		0.0405	0.0453
Boron	mg/dscf	156	109	0.175	648	45.5
	lb/hr	2.16	1.50		1.28	1.34
Calcium	mg/dscf	1.85	1.57	0.0231	9.84	1.26
	lb/hr	0.0256	0.0216		0.0194	0.0371
Cesium	mg/dscf	14.3	12.8	0.0212	64.8	9.71
	lb/hr	0.198	0.176		0.128	0.286
Iron	mg/dscf	0.765	0.699	0.00311	4.50	0.505
	lb/hr	0.0106	0.00966		0.0089	0.0149
Molybdenum	mg/dscf	7.92	5.09	0.00755	26.3	3.79
	lb/hr	0.110	0.0703		0.052	0.112
Phosphorus	mg/dscf	3.74	3.24	0.00410	20.0	2.79
	lb/hr	0.0518	0.0448		0.0394	0.0823
Potassium	mg/dscf	80.1	66.9	0.108	373	40.9
	lb/hr	1.11	0.923		0.73	1.21
Sodium	mg/dscf	431	330	0.561	2168	202
	lb/hr	5.97	4.56		4.27	5.95
Strontium	mg/dscf	0.0428	.0308	0.000104	0.178	0.0227
	lb/hr	0.000593	0.000425		0.000351	0.000668
Sulfur	mg/dscf	42.9	42.8	0.0660	321	86.8
	lb/hr	0.595	0.591		0.634	2.56

TABLE 2-2 (CONTINUED)

EMISSIONS TEST RESULTS

PARAMETER	UNITS	TEST RUN 2 HANFORD B FURNACE OUTLET	TEST RUN 3 HANFORD B FURNACE OUTLET	TEST RUN 4 IDLE FURNACE OUTLET	TEST RUN 5 HANFORD A FURNACE OUTLET	TEST RUN 6 HANFORD A CYCLONE INLET
Run Time	minutes	1110-1138	1253-1329	1628-1708	2101-2151	2350-0035
Temperature	°F	981	981		1670	645
Velocity	ft/s	14.5	14.5		4.7	12.5
Volumetric Flow Rate	scfm	104.8	104.4		14.9	223
Ammonia	ppmvd	157	142	54.1	198	0.287
	lb/hr	0.0437	0.0394		0.0078	0.000170
Chloride	ppmvd	1277	952	3.72	5830	876
	lb/hr	0.740	0.550		0.480	1.08
Hydrogen Chloride	ppmvd	< 10.2	< 4.36	< 0.889	< 19.7	< 2.01
	lb/hr	< 0.00605	< 0.00259		< 0.00167	< 0.00255
Chlorine	ppmvd	20.5	< 4.69	< 2.43	< 20.0	< 1.97
	lb/hr	0.0237	< 0.00541		< 0.0030	< 0.00486
Fluoride	ppmvd	< 90.5	93.8	0.295	< 20.0	83.3
	lb/hr	< 0.0281	0.0290		< 0.0444	0.0550
Hydrogen Fluoride	ppmvd	< 18.9	8.20	< 1.66	< 36.9	< 3.81
	lb/hr	< 0.00618	0.00267		< 0.00171	< 0.00264
Fluorine	ppmvd	< 11.1	8.75	< 1.58	< 37.5	< 3.68
	lb/hr	< 0.00686	0.00541		< 0.0030	< 0.00486

TABLE 2-3

O_2, CO_2, SO_2, NO_x, CO AND THC TEST RESULTS

DATE	TIME	LOCATION	FEED	O_2 (%)	CO_2 (%	CO (ppm)	NO_x (ppm)	NO (ppm)	SO_2 (ppm)	THC (ppm)	COMMENTS
March 8, 1995	0308-0316	Stack	Thermal Oxidizer Only	19.6	0.89	3.80	4.40	5.4			
	1619-1621	In-Furnace	B	2.91	13.5	3916	30.8	43.4	14.7		Four minutes of testing. The first minute of testing was discarded, because, the probe to close to the inlet wall.
	1827-2121	Stack		20.0	0.93	1.43	6.77	6.33	0.0		Sample line clogged after 3 minutes of sampling.
	2310-2311	Furnace Outlet		2.23	25.01	16.15	6.6	152.2	0.2	1.81	CO_2 over range. Sampling halted due to plugging.
	2349-0048	Stack		20.02	1.45	2.3	10.7	10.3	0.0		
March 9, 1995	0049-0148			20.0	1.28	0.9	8.9	8.5	0.0		
	0149-0248			19.7	1.5	16.5	13.5	13.3	0.0		
	0248-0348			19.7	1.27	8.8	10.5	10.2	0.0		
	0417-0502			18.9	1.66	> 100	12.5	12.5	0.0		All CO readings were over instrument span.
	0527-0602			18.9	1.7	> 1000	6.0	6.1	0.0		

TABLE 2-3 (CONTINUED)

O_2, CO_2, SO_2, NO_x, CO AND THC TEST RESULTS

DATE	TIME	LOCATION	FEED	O_2 (%)	CO_2 (%	CO (ppm)	NO_x (ppm)	NO (ppm)	SO_2 (ppm)	THC (ppm)	COMMENTS
March 9, 1995	0641-0741	Stack	B	19.52	0.98	2005	2.7	2.6	0.0		
	0749-0848			20.01	0.45	26.1	2.4	2.0	0.0		
	0848-0948			19.6	0.72	906.2	2.5	2.1	0.0		
	0948-1048			19.64	0.85	2701	3.8	3.5	0.0	3.2	Problem with post test system bias because sample line to the sample pump had a cut in it.
	1132-1146			19.4	1.09	290.4	4.0	4.0	0.0	12.2	The THC analyzer range was lowered to 0-100 ppm.
	1202-1301			19.39	1.27	10.1	5.3	5.3	0.0	2.5	
	1302-1401			19.47	1.28	0.5	5.6	5.6	0.0	2.2	
	1402-1428			19.52	1.30	6.3	6.6	6.8	0.0	1.9	

TABLE 2-3 (CONTINUED)

O_2, CO_2, SO_2, NO_x, CO AND THC TEST RESULTS

DATE	TIME	LOCATION	FEED	O_2 (%)	CO_2 (%	CO (ppm)	NO_x (ppm)	NO (ppm)	SO_2 (ppm)	THC (ppm)	COMMENTS
March 9, 1995	1459-1529	In-Furnace	B	10.1	16.5	6831	2.3	12.9	0.0	8.5	For all remaining CEM testing at the In-Furnace/Furnace Outlet the coil drain down condenser was replaced with a 2 impinger 0.1 N H_2SO_4 system. Data for the SO_2 and NO_x biased low due to wet impinger conditioning system. The NO_x was over range for 12 minutes. The CO was over range for 6 minutes.
	1530-1558		Idle	7.3	10.3	1822	12.4	26.4	50.4	5.0	Data for the SO_2 and NO_x biased low due to wet impinger conditioning system.

TABLE 2-3 (CONTINUED)

O_2, CO_2, SO_2, NO_x, CO AND THC TEST RESULTS

DATE	TIME	LOCATION	FEED	O_2 (%)	CO_2 (%	CO (ppm)	NO_x (ppm)	NO (ppm)	SO_2 (ppm)	THC (ppm)	COMMENTS
March 9, 1995	1758-1806	In-Furnace	A	4.42	14.7	175.9	0.0	23.7	0.98	8.0	The condenser system plugged after 9 minutes of sampling. The CO_2 was over range for 5 minutes. Data for the SO_2 and NO_x biased low due to wet impinger conditioning system.
	1846-1850			3.15	> 25.0	8.4	4.9	193.1	3.4	0.0	The sample line plugged after 6 minutes of testing. The CO_2 was over range during this time. Data for the SO_2 and NO_x biased low due to wet impinger conditioning system.

TABLE 2-3 (CONTINUED)

O_2, CO_2, SO_2, NO_X, CO AND THC TEST RESULTS

DATE	TIME	LOCATION	FEED	O_2 (%)	CO_2 (%	CO (ppm)	NO_x (ppm)	NO (ppm)	SO_2 (ppm)	THC (ppm)	COMMENTS
March 9, 1995	2035-2037	In-Furnace	A	20.35	1.09	2577	3.1	4.6	3.0	0.0	The THC not analyzed due to water in the system after four minutes of testing. Data for the SO_2 and NO_x biased low due to wet impinger conditioning system.
	2314-2343			20.35	1.23	400	0.0	4.3	0.0	0.0	CO over range for 1 minute. Data for the SO_2 and NO_x biased low due to wet impinger conditioning system.
	2344-2400			20.9	0.11	2.4	0.0	1.1	0.0	0.0	
March 10, 1995	0029-0131	Stack		20.01	1.0	2.5	3.8	4.3	0.6		
	0136-0204			19.9	0.98	2.7	5.9	5.5	5.6	6.8	

TABLE 2-4

TEMPERATURE TEST RESULTS

RUN NUMBER	RUN TIME	TEST LOCATION	TEST DATE	AVERAGE TEMPERATURE (°F)	MAXIMUM TEMPERATURE (°F)	MINIMUM TEMPERATURE (°F)	COMMENTS
M2-1	1550-1600	Furnace Outlet	March 8, 1995	1743.5	1770	1701	Preliminary Data
M2-2	2020-2035	Cyclone Inlet		232	256	198	Preliminary Data
M2-3	1022-1035	Furnace Outlet	March 9, 1995	981	1536	86	
M2-4	1615-1625			Not Measured			The duct plugged with particulate, therefore the traverse was not completed.
M2-5	2055-2120			1670	1670	1670	Single Point
M2-6	2335-2345	Cyclone Inlet		645	645	645	Single Point

TABLE 2-5

PRESSURE TEST RESULTS

RUN NUMBER	RUN TIME	TEST LOCATION	TEST DATE	AVERAGE VELOCITY (ft/s)	AVERAGE PRESSURE (in H_2O)	MAXIMUM PRESSURE (in H_2O)	MINIMUM PRESSURE (in H_2O)	COMMENTS
M2-1	1550-1600	Furnace Outlet	March 8, 1995		0.0061	0.007	0.006	Preliminary Data
M2-2	2020-2035	Cyclone Inlet			0.017	0.022	0.011	Preliminary Data
M2-3	1022-1035	Furnace Outlet	March 9, 1995	14.5	0.0233	0.070	0.012	
M2-4	1615-1625				0.046	0.21	0.007	The duct plugged with particulate, therefore the traverse was not completed.
M2-5	2055-2120			4.7	0.001	0.20	0.0005	Pitot tube plugged.
M2-6	2335-2345	Cyclone Inlet			0.0227	0.013	0.029	The last four points on the vertical axes were not measured due to particulate buildup in the duct.

3.0 INTRODUCTION

On March 8 through 10, 1995 Entropy, Inc. conducted source emissions testing for LITCO at the U.S. Bureau of Mines in Albany, Oregon. The testing was conducted on the Electric Arc Melter. The methods used during this test program were EPA Method 1 for sampling point determination, EPA Method 2 for volumetric flow rate, EPA Method 3A for O_2 and CO_2. EPA Method 4 for moisture content, an EPA Method 5 type for particulate, metals, HCl, Cl_2, HF, F_2 and NH_3, EPA Method 6C for SO_2, EPA Method 7E for NO_x, EPA Method 10 for CO and EPA Method 25A for THC.

Below is a time log which shows the source tested, sampling methods, sampling objectives, and run numbers for the test program.

TIME LOG

DATE	TIME	FEED	ACTIVITY	COMMENTS
March 8, 1995	0308-0316	Thermal Oxidizer Only	Preliminary CEM test run at the furnace stack for O_2, CO_2, CO, NO_x, and NO	
	1550-1600	Hanford B	Preliminary test run M2-1 conducted for velocity and temperature at the furnace outlet.	
	1601-1630		Test run M5-1 conducted for Particulate, metals, NH_3, HCl, Cl_2, HF and F_2 at the furnace outlet.	Test run aborted due to plant load not established.
	1618-1621 1827-2121		CEM test run at the In-furnace for O_2, CO_2, CO, NO_x, NO and SO_2.	
	2020-2025		Preliminary test run M2-2 conducted for velocity and temperature at the cyclone inlet.	
	2310-2311		CEM test run at the furnace outlet for O_2, CO_2, CO, NO_x, NO and SO_2 and THC.	
	2349-2400		CEM test run at the stack for O_2, CO_2, CO, NO_x, NO and SO_2.	
March 9, 1995	0001-0239 0240-0250 0251-0348 0417-0502 0527-0602			

TIME LOG (CONTINUED)

DATE	TIME	FEED	ACTIVITY	COMMENTS
March 9, 1995	0642-0711 0712-0741 0749-0933 0934-1048	Hanford B	CEM test run at the stack for O_2, CO_2, CO, NO_x, NO and SO_2.	
	1022-1035		Test run M2-3 conducted for velocity and temperature at the furnace outlet.	
	1110-1138		Test run M5-2 conducted for particulate, metals, NH_3, HCl, Cl_2, HF and F_2 at the furnace outlet.	
	1132-1428		CEM test run at the stack for O_2, CO_2, CO, NO_x, NO and SO_2 and THC.	
	1253-1329		Test run M5-3 conducted for particulate, metals, NH_3, HCl, Cl_2, HF and F_2 at the furnace outlet.	
	1459-1540		CEM test run in the furnace for O_2, CO_2, CO, NO_x, NO and SO_2 and THC. The condenser system was replaced with impingers to avoid plugging. The impinger contents were analyzed for NH_3.	Data for SO_2 and NO_x biased low due to wet impingement conditioning system.
	1615-1620	Idle	Test run M2-4 conducted for velocity and temperature at the furnace outlet.	Test aborted due to plugging in sampling duct.
	1628-1708		Test run M5-4 conducted for particulate, metals, NH_3, HCl, Cl_2, HF and F_2 at the furnace outlet.	
	1758-1806 1846-1850 2035-2037	Hanford A	CEM test run in the furnace for O_2, CO_2, CO, NO_x, NO and SO_2 and THC.	Data for SO_2 and NO_x biased low due to wet impingement conditioning system.
	2055-2120		Test run M2-5 conducted for velocity and temperature at the furnace outlet.	Test aborted due to plugging in pitot tube.

TIME LOG (CONTINUED)

DATE	TIME	FEED	ACTIVITY	COMMENTS
March 9, 1995	2101-2151	Hanford A	Test run M5-5 conducted for particulate, metals, NH_3, HCl, Cl_2, HF and F_2 at the furnace outlet.	
	2314-2400		CEM test run in the furnace for O_2, CO_2, CO, NO_x, NO and SO_2.	Data for SO_2 and NO_x biased low due to wet impingement conditioning system.
	2335-2345		Test run M2-6 conducted for velocity and temperature at the cyclone inlet.	
	2300-0035		Test run M5-6 conducted for particulate, metals, NH_3, HCl, Cl_2, HF and F_2 at the cyclone inlet.	
March 10, 1995	0029-0131 0136-0204		CEM test run at the stack for O_2, CO_2, CO, NO_x, NO and SO_2.	Data for SO_2 and NO_x biased low due to wet impingement conditioning system.

4.0 SOURCE PROCESS AND EQUIPMENT DESCRIPTION

4.1 Process Description

The three phase 800 kVA Arc Melter furnace uses three graphite electrodes for melting materials and maintaining furnace temperature. Gases from the furnace are passed through a series of three afterburners before passing through a cyclone for initial particulate removal. Gases from the cyclone are directed through a baghouse for final particulate removal. Flue gases then pass through an acid gas scrubber, a condenser and reheat exchanger. An induced draft next blower directs the gas through a series of carbon and HEPA filters before exhausting out of the stack.

4.2 Location Description

4.2.1 In-Furnace

The furnace is approximately four (4) feet in diameter at the location tested. The test port available was 2 inch pipe thread reduced to 0.75 inch pipe.

4.2.2 Furnace Outlet

The furnace outlet test port location was contained within an eight (8) inch duct seven (7) inches above the furnace outer wall. The test port was seven (7) inches upstream of the next flow disturbance, afterburner 2. The test port was 1.5 inch pipe reduced to 0.75 inch pipe. The total length of the test port, including the reduction was 17 inches.

4.2.3 Cyclone Inlet

The cyclone inlet duct was a horizontal 11.25 inch diameter duct. The distances to the nearest upstream and downstream disturbance were 28.5 and 32 inches, respectively. Two three inch test ports are available for sampling.

4.2.4 Furnace Stack

The stack is 13.625 inches in diameter. Two three inch test ports were available for sampling.

5.0 SAMPLING AND ANALYTICAL PROCEDURES

Following are brief descriptions of the sampling and analytical procedures employed during this test program.

5.1 Sampling Point Determination - EPA Method 1

The number and locations of the sampling and/or traverse points were determined according to the procedures outlined in EPA Method 1. Verification of absence of cyclonic flow was conducted prior to testing.

5.2 Flue Gas Velocity and Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate were determined according to the procedures outlined in EPA Method 2. Velocity measurements were made using Type S Pitot tubes conforming to the geometric specifications in the test method. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures were measured with Magnehelic gauges of appropriate range or with fluid manometers. Effluent gas temperatures were measured with Type K (chromel-alumel) thermocouples equipped with hand-held digital readouts.

5.3 Flue Gas Moisture Content - EPA Method 4

The flue gas moisture content was determined in conjunction with each EPA Method 4 type train and according to the sampling and analytical procedures outlined in EPA Method 4. The impingers were connected in series and contained reagents as listed in the following method descriptions. The impingers were contained in an ice bath to assure condensation of the flue gas stream moisture. Any moisture that was not condensed in the impingers was captured in the silica gel; therefore, all moisture was weighed and entered into moisture content calculations.

5.4 Particulate, Metals, NH_3, HCl, Cl_2, HF and F_2 - EPA Method 5 Type

The concentrations of particulate, metals, NH_3, HCl, Cl_2, HF, and F_2 were determined using the procedures and equipment described in EPA Method 5, in combination with Methods 1 through 4 described above. Particulate matter was withdrawn from the source and collected on a quartz filter maintained at a temperature in the range of 248 ± 25°F.

Sampling Train Description. The sampling train consisted of quartz or glass probe, a heated quartz fiber filter, four chilled impingers in series, a pump, a dry gas meter and a calibrated orifice. The filter was housed in a glass filter holder and supported on a glass frit. The first and second impingers each contained 100 mL of 0.1N sulfuric acid water, the third contained 100 ml of 0.1N sodium hydroxide, and the fourth contained preweighed silica gel. The probe and filter housing were further cleaned for metals by soaking in 1:1 nitric acid. All glassware was precleaned using soap, tap water and deionized (DI) water. A diagram of the sampling train used by Entropy for the testing is presented in Appendix G.

A stainless steel nozzle was used for sampling conducted at the cyclone inlet. An unheated 5 foot transfer line between the probe and filter was used for testing conducted at the furnace outlet.

Sample Train Operation. The sample train was operated according to EPA Method 5 at the cyclone inlet. Sampling at the furnace outlet was conducted at a single point and constant rate. Sampling trains were leak tested to ensure that leakage did not exceed 0.02 cfm. The filter compartment was maintained at 248°F $\pm$ 25°F during sampling.

Sample Recovery. The filter was removed and placed in a jar. The nozzle (if applicable), transfer line (if applicable), probe and filter front half were rinsed with acetone into a jar, followed by a 0.1N nitric acid rinse into a separate jar. The contents of the impingers were returned to the original jar, weighed, the weight recorded and the liquid level marked. The impingers were then rinsed with DI into the jar containing the impingers' reagent. The silica gel was returned to the original tared jar, weighed and the weight recorded.

Sample Analysis. The particulate mass, which included any material that condensed at or above the filtration temperature, was determined gravimetrically after removal of uncombined water.

Analyses for metals were conducted after completion of particulate analyses. The filter was leached with DI water. Half of the leached material was analyzed for metals while the other half was analyzed for particulate, metals, NH_3, HCl, Cl_2, HF, and F_2. The filter catch residue was digested with HNO_3/HCl to a volume of 100 mls. 50 mls was archived and 50 mls was combined with the leached fraction and 50 % of the 0.1N HNO3 front half rinse. The combined fraction was analyzed for metals by ICP and ICP/MS.

Half of both the DI leached filter and the 0.1N HNO_3 probe rinse were analyzed for fluoride and chloride by EPA Method 300.0. The impinger contents were analyzed for NH_3, HCl, Cl_2, HF, and F_2 by EPA Method 350.2.

5.5 O_2, CO_2, SO_2, NO_x, CO and THC - EPA Methods 3A, 6C, 7E, 10 and 25A

The sampling and analytical procedures outlined in EPA Methods 3A, 6C, 7E, 10 and 25A were used to measure the concentrations of gaseous species in the flue gas stream using Entropy's CEM Mobile Laboratory. The EPA Methods were followed to quantify dry basis flue gas concentrations of CO, SO_2, NO_x, THC, CO_2, and O_2. Calibration gases were selected to meet the criteria of the method. All calibration gas concentrations were certified by EPA Protocol 1 analysis.

At the beginning of each test day, a calibration error test was conducted by flowing zero, mid and high range calibration gases directly to the analyzers. Before and after each test run, system calibration bias tests were conducted by flowing zero and upscale calibration gases through the sampling system. A description of the analyzers used for the test program is presented in Table 5-1.

TABLE 5-1

ANALYZERS USED FOR EPA METHODS 3A, 6C, 7E, 10 AND 25A

Monitor Type	Manufacturer	Model Number	Detection Principle	Range - Cyclone Inlet	Range - Stack Locations
O_2	Teledyne	320P-4	Fuel Cell	0-25 %	0-25 %
CO_2	ACS (Fuji)	3300	Non-Dispersive	0-20 %	0-20 %
NO_x	Thermo Environmental	10	Chemilumin - escence	0-10,000 ppm	0-250 ppm
NO	Thermo Environmental	10	Chemilumin - escence	0-5,000 ppm	0-250 ppm
SO_2	Western Research	721 A	Non-Dispersive Ultraviolet	0-5,000 ppm	0-1,000 ppm
CO	Thermo Environmental	48	Gas Filter Correlation	0-10,000 ppm	0-100 ppm

Sample gas was withdrawn from the source using a quartz or stainless steel probe. Teflon sample line was used to transport the sample gas to the sample conditioner where the moisture was separated from the gas. At the stack a peristaltic pump was used to continuously remove the liquid from the sample conditioner. The sample gas was then passed through a post-pump condenser for further moisture removal before entering the sample manifold. At the In-Furnace test location, the sample conditioner was replaced with two impingers containing 0.1N H_2SO_4 for particulate and moisture removal Flow to each instrument was controlled by flow control valves and meters downstream of the sample manifold. Instrument outputs were permanently recorded by a PC-based data acquisition system (DAS) developed by Entropy. The DAS consisted of a Toshiba Model

3200SX portable computer, Data Translation, Inc. interface hardware, and software written by Entropy. The DAS polled analyzer signals once each second and printed one-minute and other selectable averages. It also was used to record calibration results. A layout of the sampling system used by Entropy is provided in Appendix G.

6.0 TEST CRITIQUE

6.1 Volumetric Flow Rate - EPA Method 2

6.1.1 Furnace Outlet

Run number M2-5 is considered unreliable due to low flow and particulate buildup on the pitot. Run number M2-4 could not be completed due to particulate buildup blocking the furnace outlet duct.

6.1.2 Cyclone Inlet

The sampling and leak check procedures described in EPA Method 2 were strictly followed. For run number M2-6 the last four points on the vertical axes were not measured due to particulate buildup in the duct.

6.2 Particulate, Metals, NH_3, HCl, Cl_2, HF, and F_2 - EPA Method 5 Type

6.2.1 Furnace Outlet

The leak check criteria of EPA Method 5 were met. The sampling trains were not operated isokinetically. The sample trains were operated at low flow rates to avoid clogging filters and sample lines. Samples were collected at a single point near the center of the duct. Quartz probes with an angled end were used for sampling. Samples were directed to the heated quartz filter using unheated Teflon jumpers approximately 5 feet long. Since the jumpers were unheated much of the particulate plugging occurred in the Teflon jumper section.

During run number M5-1 the plant was not operating at steady state, therefore, the run was aborted. The velocity during idle corresponding to Run number M5-4 could not be determined due to particulate buildup blocking the furnace outlet duct. The flow rate determined from M2-3 was used to calculate emissions for runs M5-2, M5-3 and M5-5.

6.2.2 Cyclone Inlet

Sampling at the cyclone inlet was conducted within 10% of 100% isokinetic. The leak check criteria of EPA Method 5 were met. Sampling for run number M5-6 was aborted at the port change due to pending loss of feed at the furnace.

6.3 O_2, CO_2, SO_2, NO_x, CO and THC - EPA Methods 3A, 6C, 7E, 10 and 25A

6.3.1 In-Furnace/Furnace Outlet

All calibrations met EPA bias and drift requirements; the data was not drift corrected. Due to frequent clogging of sample lines and filters during testing at the furnace, sample run times were shortened. To increase run time the coil condenser conditioning system was replaced with an impinger system. The impinger conditioning system consisted of three impingers in series with each of the first two impingers containing 100 ml of 0.1N H_2SO_4. The impinger system allowed longer sampling time but NO_2 and SO_2 were scrubbed out in the process. The impinger reagent from testing at the furnace during Hanford B feed was analyzed for NH_3. Approximately 23.9 ppmvd of NH_3 were determined to exist in the furnace.

During CEM testing at the stack on March 9, 1995 the sample pump sample line had a cut in it, therefore causing problems with the post test system bias.

CO and CO_2 concentrations sometimes spiked above their calibrated range. Data collected outside the calibrated range is flagged with an asterisk (*).

With the high ammonia concentration present in the flue gas stream, the NO_x analyzer equipped with the Moly-Converter was occasionally biased low.

The CEM time recorded throughout the entire test period was 10 minutes ahead of plant time.

7.0 CALIBRATION AND QUALITY ASSURANCE PROCEDURES

7.1 Equipment Inspection and Maintenance

Each item of field test equipment purchased by Entropy was assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field was inspected before it is returned to storage. During the course of these inspections, items were cleaned, repaired, reconditioned, and recalibrated as necessary.

Each item of equipment transported to the field was inspected before being packed to detect equipment problems which may originate during periods of storage. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, Entropy transported to the job site replacement equipment for all critical sampling train components.

7.2 Equipment Calibration

New items which require calibration were calibrated before initial field use. Equipment whose calibration status may have changed with use or time was inspected in the field before testing and again upon return from field use. When an item failed to meet the required calibration specifications, it was repaired and recalibrated or retired from service. All equipment was periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations were conducted in a manner, and at a frequency, which met or exceeded U. S. EPA specifications. Entropy followed the calibration procedures outlined in the applicable EPA Methods and those recommended in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods were inapplicable, Entropy used methods prescribed by the American Society for Testing and Materials (ASTM). Emissions sampling equipment requiring calibration include Pitot tubes, pressure gauges, thermometers, dry gas meters, orifices and barometers.

Calibration data were recorded on standardized forms which are checked for completeness and accuracy. Data reduction and subsequent calculations were performed using Entropy's computer facilities.

7.3 Sample Custody Procedures

Sample custody procedures were based on procedures recommended by the EPA. All samples were given a unique alphanumeric identification code. Because the samples were transported to the analytical laboratory for analysis, the custody procedures emphasize careful documentation of the sampling and analytical data and use of the chain of custody records. All sampling data, including information regarding sampling times, locations, and any specific considerations associated with sample acquisition were recorded on preformatted data sheets. All samples were inspected upon arrival at the analytical laboratory to insure sample integrity was not compromised

7.4 Sampling QA/QC Procedures

All sampling was performed in accordance with the specified test methods. Adherence to prescribed QC procedures ensured data of consistent and measurable quality. The following general QC procedures were incorporated into the sampling effort:

7.4.1 General QC Procedures

The following general QC checks were conducted:

- All sampling equipment was thoroughly checked to ensure clean and operable components.
- Equipment was inspected for possible damage from shipment.
- The number and location of the sampling traverse points were checked before taking measurements.
- The temperature measurement system was visually checked for damage and operability by measuring the ambient temperature prior to each traverse.
- All sampling data and calculations were recorded on preformatted data sheets.

7.4.2 Flue Gas Velocity

The data required to determine the flue gas velocity was collected using the methodology specified in EPA Method 2. Quality control procedures were as follows:

- Visually inspected the Type S pitot tube before and after sampling.
- Leak checked both legs of the pitot tube before and after sampling.
- The number and location of the sampling traverse points were verified before taking measurements.

7.4.3 Particulate

The particulate in the flue gas was determined using EPA Method 5 type sampling train. The following on-site QC checks were performed:

- The complete sampling train was leak checked before every run.
- Ice was maintained in the ice bath throughout each run.
- Probe and filter were heated and maintained at 248 ± °F.
- The filter and catch were visually inspected after each run.
- Run isokinetics were calculated on-site.

7.4.4 Continuous Emission Monitoring

The extensive quality assurance procedures included in the EPA Methods 3A, 6C, 7E, 10 and 25A were followed for this test program. Calibration error tests were conducted by introducing zero, mid-, and high-range calibration gases directly to the analyzers before each test set. Calibration bias tests were conducted before and after each test run by injecting zero and upscale calibration gases at the probe outlet. The results of all calibration error and sampling system bias tests were within the limits specified by the applicable methods. All calibration gases used were certified by the vendor using EPA Protocol 1 analysis (±1% tolerance).

Sampling system leak tests were conducted before and after each test by blocking the tip of the sample probe and observing the flow from the sample pump. During the leak check, flow to the analyzer manifold board was shut off and all flow from the sample pump must exit through the post-pump condensate trap. The presence of bubbling in the post pump condensate trap indicated a leak in the sampling system.

Appendix A.1
Results Tabulation
Particulate, Metals, NH_3, HCl, Cl_2, HF, and F_2

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON

SAMPLING LOCATION: FURNACE OUTLET

		M5-2 M2-3	M5-3 M2-3
	Test Date	3/9/95	3/9/95
	Run Start Time	1110	1253
	Run Finish Time	1138	1329
	Net Traversing Points	12	12
Theta	Net Run Time, Minutes	25	36
Cp	Pitot Tube Coefficient	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.9850	0.9850
Pbar	Barometric Pressure, Inches Hg	28.9	28.9
Vm	Volume of Metered Gas Sample, Dry ACF	2.34	3.841
tm	Dry Gas Meter Temperature, Degrees F	69.2	79.8
Delta-H	Average Orifice Setting, Inches H2O	0.04	0.04
Vmstd	Volume of Metered Gas Sample, Dry SCF*	2.222	3.575
Vlc	Total Volume of Liquid Collected in Impingers and Silica gel, mL	0.6	1.3
Vwstd	Volume of Water Vapor, SCF*	0.028	0.061
%H2O	Moisture Content, Percent by Volume	1.3	1.7
Mfd	Dry Mole Fraction	0.987	0.983
%CO2	Carbon Dioxide, Percent by Volume, Dry	1.3	1.3
%O2	Oxygen, Percent by Volume, Dry	19.4	19.4
%CO+N2	CO + N2, Percent by Volume, Dry	79.3	79.3
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	29.0	29.0
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.8	28.8
Pg	Flue Gas Static Pressure, Inches H2O	-5.0	-5.0
Ps	Absolute Flue Gas Pressure, Inches Hg	28.53	28.53
ts	Flue Gas Temperature, Degrees F	981	981
Delta-p	Average Velocity Head, Inches H2O	0.0233	0.0233
vs	Flue Gas Velocity, Feet per Second	14.5	14.5
A	Stack/Duct Area, Square Inches	50.27	50.27
Qsd	Volumetric Air Flow Rate, Dry SCFM*	104.8	104.4
Qaw	Volumetric Air Flow Rate, Wet ACFM	303.5	303.8

* 68 degrees F -- 29.92 Inches Of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number	M5-2	M5-3
	Run Date	3/8/95	3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *	2.222	3.575
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *	104.8	104.4
	Particulate		
mg	Catch Weight, Milligrams	4094	5443
gr/dscf	Concentration, Grains Per Dry Standard Cubic Foot	28.4	23.5
lb/hr	Emission Rate, Pounds per Hour	25.5	21.0
	Aluminum		
mg	Catch Weight, Milligrams	6.3	9.0
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	2.84	2.52
lb/hr	Emission Rate, Pounds per Hour	0.0393	0.0348
	Boron		
mg	Catch Weight, Milligrams	346	388
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	156	109
lb/hr	Emission Rate, Pounds per Hour	2.16	1.50
	Calcium		
mg	Catch Weight, Milligrams	4.1	5.6
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	1.85	1.57
lb/hr	Emission Rate, Pounds per Hour	0.0256	0.0216
	Cesium		
mg	Catch Weight, Milligrams	31.8	45.6
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	14.3	12.8
lb/hr	Emission Rate, Pounds per Hour	0.198	0.176
	Iron		
mg	Catch Weight, Milligrams	1.7	2.5
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.765	0.699
lb/hr	Emission Rate, Pounds per Hour	0.0106	0.00966
	Molybdenum		
mg	Catch Weight, Milligrams	17.6	18.2
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	7.92	5.09
lb/hr	Emission Rate, Pounds per Hour	0.110	0.0703

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number	M5-2	M5-3
	Run Date	3/8/95	3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *	2.222	3.575
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *	104.8	104.4
	Phosphorus		
mg	Catch Weight, Milligrams	8.3	11.6
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	3.74	3.24
lb/hr	Emission Rate, Pounds per Hour	0.0518	0.0448
	Potassium		
mg	Catch Weight, Milligrams	178	239
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	80.1	66.9
lb/hr	Emission Rate, Pounds per Hour	1.11	0.923
	Sodium		
mg	Catch Weight, Milligrams	957	1180
mg/dscf	Concentration, Micrograms Per Dry Standard Cubic Foot	431	330
lb/hr	Concentration, Milligrams Per Dry Standard Cubic Foot	5.97	4.56
	Strontium		
mg	Catch Weight, Milligrams	0.095	0.11
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.0428	0.0308
lb/hr	Emission Rate, Pounds per Hour	0.000593	0.000425
	Sulfur		
mg	Catch Weight, Milligrams	95.4	153
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	42.9	42.8
lb/hr	Emission Rate, Pounds per Hour	0.595	0.591
	Ammonia		
Fwt	Formula Weight, Lb-Lb Mole	17.04	17.04
mg Ion	Nitrogen Catch Weight, Milligrams	7.0	10.2
mg	Ammonia Catch Weight, Milligrams	8.51	12.41
ppmvd	Concentration, Parts Per Million Volume Dry *	191	173
lb/hr	Emission Rate, Pounds per Hour	0.0531	0.0479

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number		M5-2		M5-3
	Run Date		3/8/95		3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *		2.222		3.575
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *		104.8		104.4
	Chloride (Particulate)				
Fwt	Formula Weight, Lb-Lb Mole		35.50		35.50
mg	Hydrogen Chloride Catch Weight, Milligrams		118.6		142.3
ppmvd	Concentration, Parts Per Million Volume Dry *		1277		952
lb/hr	Emission Rate, Pounds per Hour		0.740		0.550
	Hydrogen Chloride (Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		36.50		36.50
mg	Hydrogen Chloride Catch Weight, Milligrams	<	0.97	<	0.67
ppmvd	Concentration, Parts Per Million Volume Dry *	<	10.2	<	4.36
lb/hr	Emission Rate, Pounds per Hour	<	0.00605	<	0.00259
	Chlorine (Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		71.00		71.00
mg	Chlorine Catch Weight, Milligrams		3.8	<	1.4
ppmvd	Concentration, Parts Per Million Volume Dry *		20.5	<	4.69
lb/hr	Emission Rate, Pounds per Hour		0.0237	<	0.00541
	Fluoride (Particulate)				
Fwt	Formula Weight, Lb-Lb Mole		19.00		19.00
mg	Hydrogen Fluoride Catch Weight, Milligrams	<	4.5		7.5
ppmvd	Concentration, Parts Per Million Volume Dry *	<	90.5		93.8
lb/hr	Emission Rate, Pounds per Hour	<	0.0281		0.0290
	Hydrogen Fluoride (Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		20.00		20.00
mg	Hydrogen Fluoride Catch Weight, Milligrams	<	0.99	<	0.69
ppmvd	Concentration, Parts Per Million Volume Dry *	<	18.9	<	8.20
lb/hr	Emission Rate, Pounds per Hour	<	0.00618	<	0.00267

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number		M5-2		M5-3
	Run Date		3/8/95		3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *		2.222		3.575
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *		104.8		104.4
	Fluorine				
	(Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		38.00		38.00
mg	Fluorine Catch Weight, Milligrams	<	1.1	<	1.4
ppmvd	Concentration, Parts Per Million Volume Dry *	<	11.1	<	8.75
lb/hr	Emission Rate, Pounds per Hour	<	0.00686	<	0.00541

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON

SAMPLING LOCATION: FURNACE OUTLET

		M5-4 M2-4	M5-5 M2-5
	Test Date	3/9/95	3/9/95
	Run Start Time	1628	2101
	Run Finish Time	1708	2151
	Net Traversing Points	12	12
Theta	Net Run Time, Minutes	30	11
Cp	Pitot Tube Coefficient	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.985	0.9850
Pbar	Barometric Pressure, Inches Hg	28.9	28.9
Vm	Volume of Metered Gas Sample, Dry ACF	22.205	0.998
tm	Dry Gas Meter Temperature, Degrees F	68.3	65.0
Delta-H	Average Orifice Setting, Inches H2O	1.8	0.04
Vmstd	Volume of Metered Gas Sample, Dry SCF*	21.2	0.955
Vlc	Total Volume of Liquid Collected in Impingers and Silica gel, mL	12.8	11.1
Vwstd	Volume of Water Vapor, SCF*	0.602	0.522
%H2O	Moisture Content, Percent by Volume	2.76	35.4
Mfd	Dry Mole Fraction	0.972	0.646
%CO2	Carbon Dioxide, Percent by Volume, Dry	NA	1.0
%O2	Oxygen, Percent by Volume, Dry	NA	20.5
%CO+N2	CO + N2, Percent by Volume, Dry	NA	78.5
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	NA	29.0
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	NA	25.1
Pg	Flue Gas Static Pressure, Inches H2O	NA	-5.0
Ps	Absolute Flue Gas Pressure, Inches Hg	NA	28.53
ts	Flue Gas Temperature, Degrees F	NA	1670
Delta-p	Average Velocity Head, Inches H2O	NA	0.001
vs	Flue Gas Velocity, Feet per Second	NA	4.7
A	Stack/Duct Area, Square Inches	50.27	50.27
Qsd	Volumetric Air Flow Rate, Dry SCFM*	NA	14.9
Qaw	Volumetric Air Flow Rate, Wet ACFM	NA	97.5

* 68 degrees F – 29.92 Inches Of Mercury (Hg)
ND - Not determined due to particulate blockage in sampling duct.

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number	M5-4	M5-5
	Run Date	3/9/95	3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *	21.2	0.955
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *	NA	14.9
	Particulate		
mg	Catch Weight, Milligrams	24	9086
gr/dscf	Concentration, Grains Per Dry Standard Cubic Foot	0.0178	147
lb/hr	Emission Rate, Pounds per Hour	NA	18.8
	Aluminum		
mg	Catch Weight, Milligrams	0.18	19.6
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.00849	20.5
lb/hr	Emission Rate, Pounds per Hour	NA	0.0405
	Boron		
mg	Catch Weight, Milligrams	3.7	619
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.175	648
lb/hr	Emission Rate, Pounds per Hour	NA	1.28
	Calcium		
mg	Catch Weight, Milligrams	0.49	9.4
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.0231	9.84
lb/hr	Emission Rate, Pounds per Hour	NA	0.0194
	Cesium		
mg	Catch Weight, Milligrams	0.45	61.9
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.0212	64.8
lb/hr	Emission Rate, Pounds per Hour	NA	0.128
	Iron		
mg	Catch Weight, Milligrams	0.066	4.3
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.00311	4.50
lb/hr	Emission Rate, Pounds per Hour	NA	0.0089
	Molybdenum		
mg	Catch Weight, Milligrams	0.16	25.1
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.00755	26.3
lb/hr	Emission Rate, Pounds per Hour	NA	0.052

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number	M5-4	M5-5
	Run Date	3/9/95	3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *	21.2	0.955
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *	NA	14.9
	Phosphorus		
mg	Catch Weight, Milligrams	0.087	19.1
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.00410	20.0
lb/hr	Emission Rate, Pounds per Hour	NA	0.0394
	Potassium		
mg	Catch Weight, Milligrams	2.3	356
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.108	373
lb/hr	Emission Rate, Pounds per Hour	NA	0.73
	Sodium		
mg	Catch Weight, Milligrams	11.9	2070
mg/dscf	Concentration, Micrograms Per Dry Standard Cubic Foot	0.561	2168
lb/hr	Concentration, Milligrams Per Dry Standard Cubic Foot	NA	4.27
	Strontium		
mg	Catch Weight, Milligrams	0.0022	0.17
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.000104	0.178
lb/hr	Emission Rate, Pounds per Hour	NA	0.000351
	Sulfur		
mg	Catch Weight, Milligrams	1.4	307
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.0660	321
lb/hr	Emission Rate, Pounds per Hour	NA	0.634
	Ammonia		
Fwt	Formula Weight, Lb-Lb Mole	17.04	17.04
mg Ion	Nitrogen Catch Weight, Milligrams	23.0	3.8
mg	Ammonia Catch Weight, Milligrams	28.0	4.6
ppmvd	Concentration, Parts Per Million Volume Dry *	47.12	173
lb/hr	Emission Rate, Pounds per Hour	NA	0.0078

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number		M5-4		M5-5
	Run Date		3/9/95		3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *		21.2		0.955
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *		NA		14.9
	Chloride (Particulate)				
Fwt	Formula Weight, Lb-Lb Mole		35.50		35.50
mg	Catch Weight, Milligrams		3.3		232.7
ppmvd	Concentration, Parts Per Million Volume Dry *		3.72		5830
lb/hr	Emission Rate, Pounds per Hour		NA		0.480
	Hydrogen Chloride (Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		36.50		36.50
mg	Catch Weight, Milligrams	<	0.81	<	0.81
ppmvd	Concentration, Parts Per Million Volume Dry *	<	0.889	<	19.7
lb/hr	Emission Rate, Pounds per Hour	<	NA	<	0.00167
	Chlorine (Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		71.00		71.00
mg	Catch Weight, Milligrams	<	4.3	<	1.6
ppmvd	Concentration, Parts Per Million Volume Dry *	<	2.43	<	20.0
lb/hr	Emission Rate, Pounds per Hour	<	NA	<	0.00330
	Fluoride (Particulate)				
Fwt	Formula Weight, Lb-Lb Mole		19.00		19.00
mg	Catch Weight, Milligrams		0.14	<	21.5
ppmvd	Concentration, Parts Per Million Volume Dry *		0.295	<	1007
lb/hr	Emission Rate, Pounds per Hour		NA	<	0.0444
	Hydrogen Fluoride (Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		20.00		20.00
mg	Catch Weight, Milligrams	<	0.83	<	0.83
ppmvd	Concentration, Parts Per Million Volume Dry *	<	1.66	<	36.9
lb/hr	Emission Rate, Pounds per Hour	<	NA	<	0.00171

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number		M5-4		M5-5
	Run Date		3/9/95		3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *		21.2		0.955
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *		NA		14.9
	Fluorine				
	(Impinger Catch)				
Fwt	Formula Weight, Lb-Lb Mole		38.00		38.00
mg	Catch Weight, Milligrams	<	1.5	<	1.6
ppmvd	Concentration, Parts Per Million Volume Dry *	<	1.58	<	37.5
lb/hr	Emission Rate, Pounds per Hour	<	NA	<	0.00330

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

Plant: US BUREAU OF MINES, ALBANY, OREGON
Test Location: CYCLONE INLET

Run Number	Run Date	Operator
M5-6	3/9/95	SHAWN GRAHAM

		M5-6
	Run Start Time	2350
	Run Stop Time	0035
	Net Sampling/Traversing Points	20
	Net Run Time, Minutes	32.5
Dia	Nozzle Diameter, Inches	0.429
Cp	Pitot Tube Coefficient	0.84
Y	Dry Gas Meter Calibration Coefficient	0.985
Pbar	Barometric Pressure, Inches Hg	28.9
Delta-H	Orifice Average Pressure Differential, Inches H2O	0.36
Vm	Sampled Volume of Source Gas, Dry ACF	10.139
Vmm	Sampled Volume of Source Gas, Dry ACM	0.29
tm	Dry Gas Meter Temperature, Degrees F	65
Vmstd	Sampled Volume of Source Gas, Dry SCF	9.71
Vmstdm	Sampled Volume of Source Gas, Dry SCM	0.28
Vlc	Volume of Condensed Liquid, mL	14.1
Vwstd	Volume of Water Vapor, SCF	0.66
%H2O	Moisture Content, Percent by Volume	6.40
%H2Osat	Saturated Moisture Content, Percent by Volume	100.0
Mfd	Source Gas Dry Mole Fraction	0.936
%CO2	Source Gas CO2 Content, Percent by Dry Volume	0.1
%O2	Source Gas O2 Content, Percent by Dry Volume	20.9
Md	Source Gas Dry Molecular Weight, Lb/Lb-Mole	28.85
Ms	Source Gas Wet Molecular Weight, Lb/Lb-Mole	28.2
Pg	Source Gas Static Pressure, Inches H2O	-1.30
Ps	Source Gas Absolute Pressure, Inches Hg	28.8
ts	Source Gas Temperature, Degrees F	645
Delta-p	Source Gas Average Velocity Head, Inches H2O	0.0223
vs	Source Gas Velocity, Feet/Second	12.5
A	Source Cross Sectional Area, Square Inches	99.4
Qsd	Source Gas Volumetric Flow Rate, Dry SCFM	223
Qmsd	Source Gas Volumetric Flow Rate, Dry SCMM	6.32
Qaw	Source Gas Volumetric Flow Rate, Wet ACFM	518
Qmaw	Source Gas Volumetric Flow Rate, Wet ACMM	14.7
%I	Average Isokinetic Sampling Rate, Percent	92.1

Note:
All standard volumes and flow rates based on 68 Degrees F (20 Degrees C) -- 29.92 Inches of Mercury (Hg)
The lesser of %H2O and %H2Osat was used for calculation purposes

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number	M5-6
	Run Date	3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *	9.71
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *	223
	Particulate	
mg	Catch Weight, Milligrams	10662
gr/dscf	Concentration, Grains Per Dry Standard Cubic Foot	16.9
lb/hr	Emission Rate, Pounds per Hour	32.4
	Aluminum	
mg	Catch Weight, Milligrams	14.9
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	1.53
lb/hr	Emission Rate, Pounds per Hour	0.0453
	Boron	
mg	Catch Weight, Milligrams	442
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	45.5
lb/hr	Emission Rate, Pounds per Hour	1.34
	Calcium	
mg	Catch Weight, Milligrams	12.2
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	1.26
lb/hr	Emission Rate, Pounds per Hour	0.0371
	Cesium	
mg	Catch Weight, Milligrams	94.3
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	9.71
lb/hr	Emission Rate, Pounds per Hour	0.286
	Iron	
mg	Catch Weight, Milligrams	4.9
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.505
lb/hr	Emission Rate, Pounds per Hour	0.0149
	Molybdenum	
mg	Catch Weight, Milligrams	36.8
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	3.79
lb/hr	Emission Rate, Pounds per Hour	0.112

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number	M5-6
	Run Date	3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *	9.71
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *	223
	Phosphorus	
mg	Catch Weight, Milligrams	27.1
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	2.79
lb/hr	Emission Rate, Pounds per Hour	0.0823
	Potassium	
mg	Catch Weight, Milligrams	397
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	40.9
lb/hr	Emission Rate, Pounds per Hour	1.21
	Sodium	
mg	Catch Weight, Milligrams	1960
mg/dscf	Concentration, Micrograms Per Dry Standard Cubic Foot	202
lb/hr	Concentration, Milligrams Per Dry Standard Cubic Foot	5.95
	Strontium	
mg	Catch Weight, Milligrams	0.22
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	0.0227
lb/hr	Emission Rate, Pounds per Hour	0.000668
	Sulfur	
mg	Catch Weight, Milligrams	843
mg/dscf	Concentration, Milligrams Per Dry Standard Cubic Foot	86.8
lb/hr	Emission Rate, Pounds per Hour	2.56
	Ammonia	
Fwt	Formula Weight, Lb-Lb Mole	17.04
mg Ion	Nitrogen Catch Weight, Milligrams	0.056
mg	Ammonia Catch Weight, Milligrams	0.0681
ppmvd	Concentration, Parts Per Million Volume Dry *	0.250
lb/hr	Emission Rate, Pounds per Hour	0.000170

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number		M5-6
	Run Date		3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *		9.71
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *		223
	Chloride (Particulate)		
Fwt	Formula Weight, Lb-Lb Mole		35.50
mg	Catch Weight, Milligrams		355.6
ppmvd	Concentration, Parts Per Million Volume Dry *		876
lb/hr	Emission Rate, Pounds per Hour		1.08
	Hydrogen Chloride (Impinger Catch)		
Fwt	Formula Weight, Lb-Lb Mole		36.50
mg	Catch Weight, Milligrams	<	0.84
ppmvd	Concentration, Parts Per Million Volume Dry *	<	2.01
lb/hr	Emission Rate, Pounds per Hour	<	0.00255
	Chlorine (Impinger Catch)		
Fwt	Formula Weight, Lb-Lb Mole		71.00
mg	Catch Weight, Milligrams	<	1.6
ppmvd	Concentration, Parts Per Million Volume Dry *	<	1.97
lb/hr	Emission Rate, Pounds per Hour	<	0.00486
	Fluoride (Particulate)		
Fwt	Formula Weight, Lb-Lb Mole		19.00
mg	Catch Weight, Milligrams		18.1
ppmvd	Concentration, Parts Per Million Volume Dry *		83.3
lb/hr	Emission Rate, Pounds per Hour		0.0550
	Hydrogen Fluoride (Impinger Catch)		
Fwt	Formula Weight, Lb-Lb Mole		20.00
mg	Catch Weight, Milligrams	<	0.87
ppmvd	Concentration, Parts Per Million Volume Dry *	<	3.81
lb/hr	Emission Rate, Pounds per Hour	<	0.00264

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

	Run Number		M5-6
	Run Date		3/9/95
Vmstd	Sampled Volume of Source Gas, Dry SCF *		9.71
QSD	Source Gas Volumetric Flow Rate, Dry SCFM *		223
	Fluorine (Impinger Catch)		
Fwt	Formula Weight, Lb-Lb Mole		38.00
mg	Catch Weight, Milligrams	<	1.6
ppmvd	Concentration, Parts Per Million Volume Dry *	<	3.68
lb/hr	Emission Rate, Pounds per Hour	<	0.00486

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

FIELD DATA AND RESULTS TABULATION

PLANT: US BUREAU OF MINES, ALBANY, OREGON
LOCATION: ELECTRIC ARC MELTER

Net Run Time, Minutes	83
Volume of Metered Gas Sample, Dry ACF	33.2
Ammonia	
Formula Weight, Lb-Lb Mole	17.04
Nitrogen Catch Weight, Milligrams	13.1
Ammonia Catch Weight, Milligrams	15.9
Concentration, Parts Per Million Volume Dry *	23.9

* Calculations are based on Standard Conditions of:
68 degrees F -- 29.92 Inches of Mercury (Hg)

Appendix A.2
Results Tabulation
O_2, CO_2, SO_2, NO_x, CO and THC

DATE	TIME	LOCATION	FEED	O2 (%)	CO2 (%)	CO (ppm)	NOx (ppm)	NO (ppm)	SO2 (ppm)	THC (ppm)
3/8/95	0308-0316	Stack	Idle	19.6	0.89	3.80	4.40	5.4	N/A	N/A
	1619-1621	Furnace Inlet	A	2.91	13.5	3,916	30.8	43.4	14.7	N/A
	1827-2121	Stack		20.0	0.93	1.43	6.77	6.33	0.0	N/A
	2310-2311	Furnace Outlet		2.23	25.01	16.15	6.6	152.2	0.2	18.1
	2349-0048	Stack		20.02	1.45	2.3	10.7	10.3	0	N/A
3/9/95	0049-0148	Stack		20.0	1.28	0.9	8.9	8.5	0.0	N/A
	0149-0248			19.7	1.5	16.5	13.5	13.3	0.0	N/A
	0248-0348			19.7	1.27	8.8	10.5	10.2	0.0	N/A
	0417-0502			18.9	1.66	100	12.5	12.5	0.0	N/A
	0527-0602			18.9	1.7	1,000	6.0	6.1	0.0	N/A
	0641-0741			19.52	0.98	2005	2.7	2.6	0.0	N/A
	0749-0848			20.01	0.45	26.1	2.4	2.0	0.0	N/A
	0848-0948			19.6	0.72	906.2	2.5	2.1	0.0	N/A
	0948-1048			19.64	0.85	2,701	3.8	3.5	0.0	3.2
	1132-1146			19.4	1.09	290.4	4.0	4.0	0.0	12.2
	1202-1301			19.39	1.27	10.1	5.3	5.3	0.0	2.5
	1302-1401			19.47	1.28	0.5	5.6	5.6	0.0	2.2
	1402-1428			19.52	1.30	6.3	6.6	0.0	1.9	
	1459-1558	Furnace Inlet	B	8.7	13.37	4326	7.3	19.7	25.0	6.8
	1758-1806			4.42	14.7	175.9	0.0	23.7	0.98	8.0
	1846-1850			3.15	25.0	8.4	4.9	193.1	3.4	0.0
	2035-2037			20.35	1.09	2,577	3.1	4.6	3.0	0.0
	2314-2343			20.35	1.23	400	0.0	4.3	0.0	0.0
	2344-2400			20.9	.11	2.4	0.0	1.1	0.0	0.0
3/10/95	0029-0131	Stack		20.01	1.0	2.5	3.8	4.3	0.6	N/A
	0136-0204			19.9	0.98	2.7	5.9	5.5	5.6	N/A

N/A - Not Applicable

Appendix B
Example Calculations
Particulate, Metals, NH_3, HCl, Cl_2, HF, and F_2

EXAMPLE CALCULATIONS, RUN M2-3

SAMPLED VOLUME OF METERED GAS SAMPLE, DRY STANDARD CUBIC FEET

Vmstd = [(Tstd + 460)/Pstd] * Y * Vm * (Pbar + Delta-H/13.6) / (460 + tm)
= [68 + 460)/29.92] * 0.985 * 2.340 * (28.90 + 0.04/13.6) / (460 + 69.2)
= 2.22150

VOLUME OF WATER VAPOR, STANDARD CUBIC FEET

Vwstd = 0.04707 * Vlc * (460 + Tstd) / 528
= 0.04707 * 0.6 * (460 + 68) / 528
= 0.02824

MOISTURE CONTENT, PERCENT BY VOLUME

%H2O = Vwstd / (Vwstd + Vmstd)
= 0.028 / (0.028 + 2.222)
= 1.255

DRY MOLE FRACTION, LB-MOLE/LB-MOLE

Mfd = 1 - %H2O / 100
= 1 - 1.3 / 100
= 0.98745

DRY MOLECULAR WEIGHT OF FLUE GAS, LB/LB-MOLE

Md = (%CO2 * (fwtCO2/100) + (%O2 * (fwtO2/100))) + ((100-%CO-%O2) * (fwtCO&N2/100))
= (1.30 * (44/100) + (19.40 * (32/100))) + ((100-1.30-19.40 * (28/100))
= 28.984

WET MOLECULAR WEIGHT OF FLUE GAS, LB/LB-MOLE

Ms = (Md * Mfd) + (fwtH2O) * (%H20/100)
= (28.98 * 0.987) + ((18.0) * (1.26/100))
= 28.846

ABSOLUTE FLUE GAS PRESSURE, INCHES MERCURY

Ps = Pbar + (Pg/13.6)
= 29 + (-5.00/13.6
= 28.53

AVERAGE FLUE GAS VELOCITY, FEET PER SECOND

vs = 85.49 * Cp * SQRT[Delta-p*(460+ts)/Ps/Ms]
= 85.49 * 0.84 * SQRT[0.0233(460+981)/28.53/28.85]
= 14.491

VOLUMETRIC FLOW RATE, DRY STANDARD CUBIC FEET PER MINUTE

Qsd = (60/144) * Mfd * vs * A * (Tstd+460) / (ts+460) * (Ps/Pstd)
= (60/144) * 0.987 * 14.49 * 50 * (68+460) / (981+460) * (28.53/29.92)
= 105

EXAMPLE CALCULATIONS, RUN M5-6

SAMPLED VOLUME OF SOURCE GAS, DRY ACTUAL CUBIC FEET
Vmm = Vm * 0.028317
= 10.139 * 0.028317
= 0.2871

SAMPLED VOLUME OF SOURCE GAS, DRY STANDARD CUBIC FEET
Vmstd = [(Tstd + 460)/Pstd] * Y * Vm * (Pbar + Delta-H/13.6) / (460 + tm)
= [(68 + 460)/29.92] * 0.9850 * 10.139 * (28.90 + 0.36/13.6) / (460 + 65)
= 9.712

SAMPLED VOLUME OF SOURCE GAS, DRY STANDARD CUBIC METERS
Vmstdm = Vmstd * 0.028317
= 9.712 * 0.028317
= 0.275

VOLUME OF WATER VAPOR, STANDARD CUBIC FEET
Vwstd = 0.002667 * [(Tstd + 460) / Pstd] * Vlc
= 0.002667 * [(68 + 460) / 29.92] * 14.1
= 0.664

MOISTURE CONTENT, PERCENT BY VOLUME
%H2O = Vwstd / (Vwstd + Vmstd)
= 0.664 / (0.664 + 9.712)
= 6.40

DRY MOLE FRACTION, LB-MOLE/LB-MOLE
Mfd = 1 - %H2O/100
= 1 - 6.40/100
= 0.936

DRY MOLECULAR WEIGHT, LB/LB-MOLE
Md = 44*(%CO2/100) + 32*(%O2/100) + 28*{[100-(%CO2+%O2)]/100}
= 44*(0.1/100) + 32*(20.9/100) + 28*{[100-(0.1+20.9)]/100}
= 28.85

WET MOLECULAR WEIGHT, LB/LB-MOLE
Ms = Md*Mfd + 18.0*%H2O/100
= 28.85*0.936 + 18.0*6.40/100
= 28.16

ABSOLUTE PRESSURE, INCHES OF MERCURY
Ps = Pbar + Pg/13.6
= 28.90 + -1.30/13.6
= 28.80

VELOCITY, FEET PER SECOND
vs = 85.49 * Cp * SQRT[Delta-p*(460+ts)/Ps/Ms]
= 85.49 * 0.84 * SQRT[0.0223*(460+645)/28.80/28.16]
= 12.51

Appendix C.1
Field Data
Particulate, Metals, NH_3, HCl, Cl_2, HF, and F_2

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Sampling and Velocity Traverse Point Determination
EPA Method 1

CLIENT: Lockheed Idaho
PLANT NAME: US Bureau of Mines
CITY, STATE: Albany Oregon
SAMPLING LOCATION: Furnace Outlet

NO. OF PORTS AVAILABLE: 1
NO. OF PORTS USED: 1
PORT INSIDE DIAMETER: 1"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT: 17" 18¼
NIPPLE LENGTH AND/OR WALL THICKNESS: 9"
DEPTH OF STACK OR DUCT: 8"
STACK OR DUCT WIDTH (IF RECTANGULAR): NA

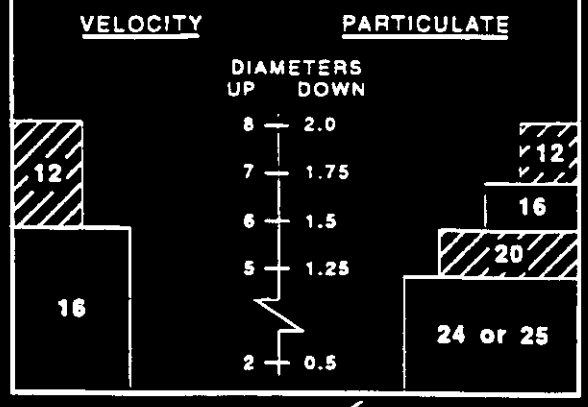
EQUIVALENT DIAMETER:
$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(\quad)(\quad)}{(\quad + \quad)} =$ NA

DISTANCE FROM PORTS TO FLOW DISTURBANCES	UPSTREAM	DOWNSTREAM
	7"	7"
DIAMETERS	0.9	0.9

STACK/DUCT AREA = $\pi(8/2)^2$ = 50.27 IN^2

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



PITOT USED (✓) TYPE "S" ✓ STANDARD ____

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	0.067	0.54	9 1/2
2	0.25	2	11
3	0.75	6	15
4	0.933	7.46	16 1/2
5			
6			
7			
8			
9			
10			
11	0.044	0.35 → 0.5	9 1/2
12	0.146	1.1/4	10 1/4
13	0.296	2 3/8	11 3/8
14	0.704	5 5/8	14 5/8
15	0.854	6 3/4	15 3/4
16	0.956	7 1/2	16 1/2
17			
18			
19			
20			
21			
22			
23			
24			
25			

LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	26.3	23.5	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	76.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.8	94.6
23											96.8
24											98.9

LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

F-0016 rev. 8-93

AIR FLOW RATE DETERMINATIONS

WHC-SD-WM-VI-032
Revision 0

Client: Lockheed Idaho
Job No.: 13911
Plant: US Bureau of Mines
Run No.: MZ-1
City/State: Albany
Date: 3/8/95
Test Location: Furnace Outlet Burner 1 Off
Personnel: SCG, HDA
Barometric Pressure (Pbar): 29.3 "Hg
Static Presure (Pg): -1.0 "H_2O
Pitot/Orifice ID: HP 1
Pitot Coef. (C_p): 0.84
Pres. Gauge Set ID: Multimeter
Thermocouple ID: TC39
Duct Depth/Diameter: 8"
Width: 0
---Specify inches (") or feet (')---

VELOCITY TRAVERSES
Start-Finish Times: 1550 - 1600

Point No.	ΔP In. H_2O	Temp. °F
1	0.005	1701
2	0.006	1730
3	0.007	1770
4	0.006	1770
5	0.006	1760
6	0.007	1730
Avg.*	0.0001	1743.5

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	CO (C) Reading	%CO (C-B)
	Average					

Orsat ID _____ Bag ID _____ F_o _____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =		SCFM
Wet at Stack Conditions, Qaw =		ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.

F-1023 rev. 9-93

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Plant Name: US Bureau of Mines
Run No.: M2-2
City/State: Albany, Oregon
Date: 3/8/95
Test Location: Cyclone Baghouse Inlet
Personnel: SCL
Barometric Pres. (Pbar): 29.3 In. Hg
Static Pres. (Pg): _____ In. H_2O
Pitot/Orifice ID: HP1
Pitot Coef. (Cp): 0.84
Pres. Gauge Set ID: Multimeter
Thermocouple ID: TC37
Duct Length/Diameter: 119"
Width: —
--Specify inches (") or feet (')--

VELOCITY TRAVERSES
Start-Finish Times: 2020 - 2025

Point No.	ΔP In. H_2O	Temp. °F
A1	0.011	200
2	0.012	202
3	0.015	229
4	0.015	233
5	0.016	240
6	0.018	232
7	0.018	237
8	0.02	236
9	0.02	234
10	0.02	234
11	0.02	232
12	0.02	228
B1	0.012	198
2	0.012	210
3	0.018	222
4	0.015	233
5	0.016	23[illegible]
6	0.02	242
7	0.018	243
8	0.02	245
9	0.02	248
10	0.02	253
11	0.022	254
12	0.016	256
Avg.*	0.017	232

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	$\%O_2$ (B-A)	$\%CO+N_2$ (100-B)
	Average				

Bag No. _____ Pump _____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd	=	SCFM
Wet at Stack Conditions, Qaw	=	ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.

See page 2 for field flow rate calculations.

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F-1023 rev. 7-92

ENTROPY

AIR FLOW RATE DETERMINATIONS

Client: Lockheed — Job No.: 13911

Plant: US Bureau of Mines — Run No.: @ M2-3

City/State: Albany, Oregon — Date: 3/9/95

Test Location: Furnace Outlet — Personnel: SCG, DEWS

Barometric Pressure (Pbar): 2 "Hg — Static Pressure (Pg): -5.0 "H_2O

Pitot/Orifice ID: HP-1 — Pitot Coef. (C_p): 0.84 — Pres. Gauge Set ID: Multinder

Thermocouple ID: TC39 — Duct Depth/Diameter: 8" — Width: ___

---Specify inches (") or feet (')---

VELOCITY TRAVERSES
Start-Finish Times: 1022 - 1035

Point No.	ΔP In. H_2O	Temp. °F
1	.028	86
2	.020	174
3	.014	986
4	.070	1567
5	.013	1534
6	.012	1536
1030 3	.06 / .36	
1031	.26 / .08	not
1032	-.41 / -.148	vs-0
1033	.17 / 2.90	for
1034	2.63 / 1.228	calc
1035	-.91 / -2.94	
Avg.*	0.0233	981

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	CO (C) Reading	%CO (C-B)
	Average					

Orsat ID ___ Bag ID ___ F_o ___

FYRITE DATA, % CO_2

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd	=	SCFM
Wet at Stack Conditions, Qaw	=	ACFM

ADDITIONAL DATA

C 5

* ΔP average is square of average square root.

F-1023 rev. 9-93

WHC-SD-WM-VI-032
Revision 0

AIR FLOW RATE DETERMINATIONS

Client: Lockheed Idaho — Job No. 13911

Plant: US Bureau of Mines — Run No. M2-4

City/State: Albany, Oregon — Date: 3/9/95

Test Location: Furnace outlet — Personnel: SCG

Barometric Pressure (Pbar): 28.7 "Hg — Static Presure (Pg): ? "H_2O

Pitot/Orifice ID: [illegible] — Pitot Coef. (C_p): 0.84 — Pres. Gauge Set ID: Multimeter

Thermocouple ID: TC 39 — Duct Depth/Diameter: 8" — Width: ____

---Specify inches (") or feet (')---

VELOCITY TRAVERSES
Start-Finish Times: 16[illegible]15 - 16[illegible]

Point No.	ΔP In. H_2O	Temp. °F
1	.21	
2	.01	
3	0.007(?)	in port
4		
5		
6		
Avg.*	0.0[illegible]6	

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	CO (C) Reading	%CO (C-B)
	Average					

Orsat ID ____ Bag ID ____ F_o ____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =	SCFM
Wet at Stack Conditions, Qaw =	ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.

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AIR FLOW RATE DETERMINATIONS

Client: Lockheed Idaho — Job No. 1394

Plant: US Bureau of Mines — Run No. M2-5

City/State: Albany, Oregon — Date: 3/9/95

Test Location: Furnace WAAH Outlet — Personnel: SCG

Barometric Pressure (Pbar): 28.9 "Hg — Static Presure (Pg): ? "H_2O

Pitot/Orifice ID: _____ — Pitot Coef. (C_p): 0.84 — Pres. Gauge Set ID: Multimeter

Thermocouple ID: TC — Duct Depth/Diameter: 8" — Width: —

---Specify inches (") or feet (')---

2055 - 2120

VELOCITY TRAVERSES
Start-Finish Times: ~~2055~~ - _____

Point No.	ΔP In. H_2O	Temp. °F
1	0.0005	1670
2	~~0.0005~~ 0.0001	
3	0.014	
4	0.08	
5	0.2	
6	0.	
Avg.*	0.001	1670

Airdata Multimeter

plugged pitot high side

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	CO (C) Reading	%CO (C-B)
	Average					

Orsat ID _____ Bag ID _____ F_o _____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =	SCFM
Wet at Stack Conditions, Qaw =	ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.

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AIR FLOW RATE DETERMINATIONS

Client: Lockheed Idaho — Job No. 13911

Plant: US Bureau of Mines — Run No. M2-6

City/State: Albany, Oregon — Date: 3/9/95

Test Location: Cyclone ~~Baghouse~~ INLET — Personnel: EWS, SCL

Barometric Pressure (Pbar): 28.7 "Hg — Static Presure (Pg): -1.3 "H_2O

Pitot/Orifice ID: Plant — Pitot Coef. (C_p): 0.84 — Pres. Gauge Set ID: Multimeter

Thermocouple ID: TC 38 — Duct Depth/Diameter: _____ Width: _____

---Specify inches (") or feet (')---

0034 POST

VELOCITY TRAVERSES
Start-Finish Times: ~~1010~~ - 2345

	Point No.	ΔP In. H_2O	Temp. °F
0.01	A-1	0.020	~~[illegible]~~
0.012	2	0.024	645
	3	0.025	
0.030	4	0.035	
	5	0.028	
0.030	6	0.029	
	7	0.015	
0.024	8	0.020	
	9	0.021	
0.019	10	0.017	
	11	0.020	
0.013	12	0.013	
	B-1	0.026	
0.027	2	0.028	
	3	0.029	
0.033	4	0.020	
	5	0.023	
0.028	6	0.020	
	7	0.033	
0.005	8	0.016	
part. bulb T=585	9		
	10		
	11		
	12		
	Avg.*	0.0227	645

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	CO (C) Reading	%CO (C-B)
	Average					

Orsat ID _____ Bag ID _____ F_o _____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd	=	SCFM
Wet at Stack Conditions, Qaw	=	ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.

F-1023 rev. 9-93

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SAMPLING DATA - METHOD(S) _____

CLIENT: US Bureau of Mines
PLANT: Lockheed
CITY/STATE: Albany, Oregon
JOB NO.: 13911
RUN NO.: M5-2
DATE: 3/9/95
SAMPLING LOC.: Furnace Outlet
TIME START: 1110
TIME FINISH: 1139
BAROMETRIC PRESSURE, IN. HG: 28.9
STATIC PRESSURE, IN. H_2O:
OPERATOR: SCC
ASST(S):

LEAK CHECK, VACUUM IN. HG	15	10	15			
LEAK RATE, CUBIC FEET/MIN.	0.004	0.004	0.004			

EQUIPMENT CHECKS*

- NA PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC ____ °F PRE
- ✓ TC ____ °F POST
- NA ORSAT SYSTEM

FILTER/XAD	TARE WT.
0156	0.4223

EQUIPMENT I.D. NUMBERS

REAGENT BOX: ____ METER BOX: N30 Y: 0.9850
PITOT: ____ C_p 0.84 NOZ'L: NA DIA.: NA
TC READOUT: ____ TC PROBE: N/A UMBILICAL: CU1
SAMPL'G BOX: ____ ORSAT PUMP: NA TEDLAR BAG: NA

NOMOGRAPH DATA

DELTA H@
METER TEMP
EST. $\%H_2O$
C FACTOR
STACK TEMP
REF DELTA P
K FACTOR

LEAK CHECKS

B 827.210 B ____
E 827.265 E ____
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____

PYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER BOX	IMPING EXIT	PROBE	COND. EXIT
		0	825.15										
1		5	825.69	NA	64	NA	0.05	0.05	1	250	66	NA	NA
2		10	826.25		66		0.05	0.05	5	280	68		
3		15	826.62		68		0.03	0.05	7	250	70		
4		20	827.03		71		0.03	0.05	9	245	70		
5		25	827.545		77		0.03	0.05	15	255	66		
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25			2.340										

off 11:34 on 1137

25	~~2.395~~	NA	69.2	NA	0.05
Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

SAMPLING DATA - METHOD(S)

CLIENT: Lockheed Idaho
PLANT: US Bureau of Mines
CITY/STATE: Albany Oregon
SAMPLING LOC.: Furnace Outlet
BAROMETRIC PRESSURE, IN. HG: 28.9
STATIC PRESSURE, IN. H_2O: NA
LEAK CHECK, VACUUM IN. HG: 15 15
LEAK RATE, CUBIC FEET/MIN.: 0.008 0.004

RUN NO.: M5-3 3
JOB NO.: 13911
DATE: 3/9/95
TIME START: 1253
TIME FINISH: 1329
OPERATOR: SCC
ASST(S): –

EQUIPMENT CHECKS*
- NA PITOT, PRETEST
- PITOT, POSTTEST
- NOZZLE, PRE/POST
- TC ___ °F PRE
- TC ___ °F POST
- ORSAT SYSTEM

FILTER/XAD	TARE WT.
Q148	0.4092

EQUIPMENT I.D. NUMBERS
REAGENT BOX: ___ METER BOX: N30 Y: 0.9850
PITOT: NA C_p: 0.84 NOZ'L: NA DIA.: NA
TC READOUT: NA TC PROBE: NA UMBILICAL: ~~NO~~ CVI
SAMPL'G BOX: 73 ORSAT PUMP: NA TEDLAR BAG: NA

NOMOGRAPH DATA
DELTA HQ: 1.8243
METER TEMP: NA
EST. %H_2O:
C FACTOR:
STACK TEMP:
REF DELTA P:
K FACTOR:

LEAK CHECKS (SCC)
B ~~[illegible]~~ B
F E
B B
E E
B B
E E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	828.315 DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER BOX	IMPING EXIT	PROBE	COND. EXIT
		0	~~828.700~~										
1		5	828.98	NA	76	NA	0.04	0.04	1	260	62	NA	NA
2		10	829.62		76		0.04	0.04	1	260	62		
3		15	830.14		78		0.04	0.04	1	260	64		
4		20	830.77		78		0.04	0.04	2	260	64		
5		25	831.29		80		0.04	0.04	2	260	64		
6		30	831.66		82		0.04	0.04	3	240	62		
7		35	832.04		84		0.04	0.04	5	245	62		
8	off	36	832.156		84		0.04	0.04	10	245	60		
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													

36	3.841	NA	79.8	NA	0.04
Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

SAMPLING DATA - METHOD(S)

CLIENT: Lockheed Idaho
PLANT: US Bureau of Mines
CITY/STATE: Albany, Oregon
SAMPLING LOC.: Furnace Outlet
BAROMETRIC PRESSURE, IN. HG: 28.9
STATIC PRESSURE, IN. H_2O: NA
LEAK CHECK, VACUUM IN. HG: 12 | 5
LEAK RATE, CUBIC FEET/MIN.: 0.004 | 0.002
RUN NO.: M5-4 4
JOB NO.: 13911
DATE: 3/9/95
TIME START: 1628
TIME FINISH: 1708
OPERATOR: SCL
ASST(S): —

EQUIPMENT CHECKS*

- NA PITOT, PRETEST
- PITOT, POSTTEST
- NOZZLE, PRE/POST
- TC ____ °F PRE
- TC ____ °F POST
- ORSAT SYSTEM

FILTER/XAD	TARE WT.
QX147	0.4112

EQUIPMENT I.D. NUMBERS

REAGENT BOX ____ METER BOX N30 Y 0.9850
PITOT NA C_p 0.84 NOZ'L NA DIA. NA
TC READOUT NA TC PROBE NA UMBILICAL CW1
SAMPL'G BOX 27 ORSAT PUMP NA TEDLAR BAG NA

NOMOGRAPH DATA

DELTA HB 1.824
METER TEMP NA
EST. $\%H_2O$
C FACTOR
STACK TEMP
REF DELTA P
K FACTOR

LEAK CHECKS

B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER BOX	IMPING EXIT	PROBE	COND. EXIT
		0	832.500										
1	2"	5	836.15	NA	60	NA	1.8	1.8	2	260	60	NA	NA
2	inside	10	839.85		62		1.8	1.8	2	260	64		
3	duct	15	843.75		65		1.8	1.8	2	270	48		
4	gas	20	847.66		70		1.8	1.8	2	255	40		
5	over	25	850.05		74		1.8	1.8	2	250	42		
6		30	854.705		76		1.8	1.8	2	250	42		
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													

30	22.205	NA	68.3	NA	1.8
Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

WHC-SD-WM-VI-032
Revision 0

CLIENT Lockheed Idaho
PLANT US Bureau of Mines
CITY/STATE Albany, Oregon
SAMPLING LOC. Furnace Outlet
BAROMETRIC PRESSURE, IN. HG 28.7
STATIC PRESSURE, IN. H2O NA
LEAK CHECK, VACUUM IN. HG 15 15 15
LEAK RATE, CUBIC FEET/MIN. 0.004 0.004 0.004

RUN NO. M5-5
JOB NO. 13911
DATE 3/9/95
TIME START 2101
TIME FINISH 2151
OPERATOR SCG
ASST(S)

EQUIPMENT CHECKS*

- NA PITOT, PRETEST
- PITOT, POSTTEST
- NOZZLE, PRE/POST
- TC ___ °F PRE
- TC ___ °F POST
- ORSAT SYSTEM

FILTER/XAD	TARE WT.
Q149	0.4170

EQUIPMENT I.D. NUMBERS

REAGENT BOX ___ METER BOX N30 Y 0.9850
PITOT NA Cp 0.84 NOZ'L NA DIA. NA
TC READOUT NA TC PROBE NA UMBILICAL CUU1
SAMPL'G BOX 73 ORSAT PUMP NA TEDLAR BAG NA

NOMOGRAPH DATA

DELTA H@
METER TEMP
EST. %H2O
C FACTOR
STACK TEMP
REF DELTA P
K FACTOR

LEAK CHECKS

B 855.860 B ___
E 856.00 E ___
B 856.123 B ___
E 856.25 E ___
B ~~856.865~~ B ___
E (S) E ___

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER BOX	IMPING EXIT	PROBE	COND. EXIT
		0	855.400										
1		5	856.1	NA	58	NA	0.04	0.04	1	235	52	NA	NA
2		10	856.75		72		0.04	0.04	1				
3		15	856.865										
4		20											
5		25											
6		30											
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25			0.990										

off 2105 change out transfer line on 2135 off 2136 switch probes on 2150

15	~~1.465~~	NA	65	NA	0.04
Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

C 12

Sampling and Velocity Traverse Point Determination
EPA Method 1

PLANT NAME: US Bureau of Mines
CITY, STATE: Albany, OR
SAMPLING LOCATION: BAGHOUSE (Cyclone) INLET

NO. OF PORTS AVAILABLE: 2
NO. OF PORTS USED: 2
PORT INSIDE DIAMETER: 3 1/4"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT: 16 3/4
NIPPLE LENGTH AND/OR WALL THICKNESS: 5 1/2
DEPTH OF STACK OR DUCT: 11 1/4
STACK OR DUCT WIDTH (IF RECTANGULAR): N/A

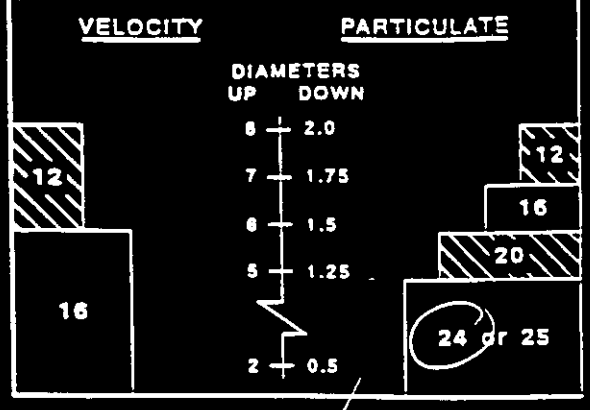
EQUIVALENT DIAMETER:
$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(\quad)(\quad)}{(\quad + \quad)} =$ N/A

DISTANCE FROM PORTS TO FLOW DISTURBANCES	UPSTREAM	DOWNSTREAM
	28 1/2	32
DIAMETERS	2.53	2.84

STACK/DUCT AREA = _____ = 99.4 IN^2

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



PITOT USED (✓) TYPE "S" ✓ STANDARD ____

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	2.1	.24	5 3/4
2	6.7	.75	6 1/4
3	11.8	1.33	6 7/8
4	17.7	1.99	7 1/2
5	25	2.81	8 3/8
6	35.6	4	9 1/2
7	64.4	7.25	12 3/4
8	75	8.43	13 7/8
9	82.3	9.26	14 3/4
10	88.2	9.92	15 3/8
11	93.3	10.5	16
12	97.9	11.01	16 1/2
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	28.9	22.0	18.9	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.8	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

F-0016 rev. 5-92

SEE REVERSE FOR FIELD USE CHECKLIST

ENTROPY

WHC-SD-WM-VI-032
Revision 0

CLIENT Lockheed Idaho
PLANT US Bureau of Mines
CITY/STATE Albany, Oregon
SAMPLING LOC. Cyclone Baghouse Inlet
BAROMETRIC PRESSURE, IN. HG 28.9
STATIC PRESSURE, IN. H_2O -1.3
LEAK CHECK, VACUUM IN. HG 15
LEAK RATE, CUBIC FEET/MIN. 0.002

RUN NO. 6M5-6
JOB NO. 13911
DATE 3/9/95
TIME START 2350
TIME FINISH 0035
OPERATOR SCG
ASST(S) Gux

EQUIPMENT CHECKS*

- NA PITOT, PRETEST
- 1 PITOT, POSTTEST
- 1 NOZZLE, PRE/POST
- 1 TC ___ °F PRE
- 1 TC ___ °F POST
- 1 ORSAT SYSTEM

FILTER/XAD	TARE WT.

EQUIPMENT I.D. NUMBERS

REAGENT BOX ___ METER BOX N 30 Y 0.985
PITOT NA C_p 0.84 NOZ'L ___ DIA. 0.429
TC READOUT NA TC PROBE TC 28 UMBILICAL WD1
SAMPL'G BOX 31 ORSAT PUMP NA TEDLAR BAG NA

NOMOGRAPH DATA

DELTA H@	1.8243
METER TEMP	70
EST. %H_2O	2
C FACTOR	1.014
STACK TEMP	645
REF DELTA P	0.097
K FACTOR	18.939

LEAK CHECKS

B 868.592 B ___
E 868.644 E ___
B ___ B ___
E ___ E ___
B ___ B ___
E ___ E ___

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER BOX	IMPING EXIT	PROBE	COND. EXIT
		0	858.500										
1	A1	2½	859.2	0.020	60	645	0.22	0.22	1	250	64	NA	NA
2	2	15	860.04	0.024	60		0.44	0.44	1	250	62		
3	3	17½	860.99	0.025	60		0.47	0.47	2	260	60		
4	4	10	861.95	0.035	61		0.44	0.44	2	260	60		
5	5	22½	862.875	0.028	62		0.34	0.34	2	260	60		
6	6	15	863.90	0.029	63		0.44	0.44	3	260	60		
7	7	17½	864.70	0.015	64		0.25	0.25	3	260	60		
8	8	20	865.44	0.020	66		0.34	0.34	3	255	60		
9	9	22½	866.31	0.021	68		0.36	0.36	3½	255	60		
10	10	25	867.12	0.017	69		0.3	0.24	4	255	60		
11	11	27½	867.90	0.020	70		0.35	0.35	4	260	60		
12	12	30	868.592	0.013	71		0.22	0.22	5	260	60		
13	B1	32½	868.[illegible]	0.026	70		0.45	0.45					
14	2	35		0.028									
15	3	37½		0.029									
16	4	40		0.020									
17	5	42½		0.023									
18	6	45		0.020									
19	7	47½		0.033									
20	8	50		0.016									
21	9												
22	10												
23	11												
24	12												
25													

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
50	~~7.81~~ SF	0.02226	64.9	645	~~0.3669~~ SF
	10.139				0.3638

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Appendix C.2
Field Data
O_2, CO_2, SO_2, NO_x, CO and THC

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY, OREGON

REASON: DIRECT CALIBRATION ERROR

DATE : 03-08-1995 TIME: 02:41 - 02:55

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.15
13	STACK	% O2	20.06	20.03
14	STACK	% CO2	0.00	0.04
14	STACK	% CO2	18.02	18.06
11	STACK	ppmNO	0.0	0.4
11	STACK	ppmNO	177.7	177.7

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: CONTINUE WITH DIRECT CALIBRATION ERROR

DATE : 03-08-1995 TIME: 02:55 - 02:57

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
10	STACK	ppmNOx	0.0	1.5
10	STACK	ppmNOx	177.7	179.5

US BUREAU OF MINES - ALBANY, OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO
03:08	19.58	0.89	3.8	4.4	5.4
03:09	19.58	0.89	3.3	4.4	5.4
03:10	19.58	0.88	2.7	4.4	5.4
03:11	19.57	0.88	3.2	4.4	5.4
03:12	19.55	0.89	3.0	4.4	5.4
03:13	19.54	0.89	3.4	4.4	5.5
03:14	19.54	0.89	3.3	4.4	5.5
03:15	19.54	0.89	3.2	4.4	5.4
03:16	19.55	0.89	2.8	4.4	5.5

COMMENTS: PRETEST DATA WITH NG ONLY

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: US BUREAU OF MINES - ALBANY, OREGON

DATE: 03-08-1995 TIME: 11:30

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
13	IN-FUR	% O2	25	0.10 V	0%
14	IN-FUR	% CO2	20	1.00 V	0%
12	IN-FUR	ppmCO	10000	10.00 V	0%
10	IN-FUR	ppmNOx	10000	10.00 V	0%
11	IN-FUR	ppmNO	5000	10.00 V	0%
9	IN-FUR	ppmSO2	5000	10.00 V	0%

AVERAGING PERIODS: 15 MINUTES, ONE HOUR,
NO EMISSION RATE CALCULATIONS

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY, OREGON

REASON: INITIAL DIRECT CALIBRATION ERROR

DATE : 03-08-1995 TIME: 13:00 - 13:35

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	IN-FUR	% O2	0.00	0.15
13	IN-FUR	% O2	11.07	11.29
13	IN-FUR	% O2	20.06	20.14
14	IN-FUR	% CO2	0.00	0.01
14	IN-FUR	% CO2	5.26	5.36
14	IN-FUR	% CO2	9.13	9.11
14	IN-FUR	% CO2	18.02	18.05
12	IN-FUR	ppmCO	0.0	2.0
12	IN-FUR	ppmCO	2999.0	3078.6
12	IN-FUR	ppmCO	5010.0	5085.6
12	IN-FUR	ppmCO	7995.0	8033.0
10	IN-FUR	ppmNOx	0.0	0.2
10	IN-FUR	ppmNOx	3980.0	3879.9
10	IN-FUR	ppmNOx	7300.0	7310.4
11	IN-FUR	ppmNO	0.0	2.1
11	IN-FUR	ppmNO	3980.0	3970.7
9	IN-FUR	ppmSO2	0.0	12.3
9	IN-FUR	ppmSO2	847.9	850.5
9	IN-FUR	ppmSO2	1688.0	1677.7

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY, OREGON

REASON: INITIAL SYSTEM BIAS

DATE : 03-08-1995 TIME: 13:36 - 13:53

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	IN-FUR	% O2	0.00	0.18
13	IN-FUR	% O2	11.07	11.16
14	IN-FUR	% CO2	0.00	0.05
14	IN-FUR	% CO2	9.13	9.04
12	IN-FUR	ppmCO	0.0	2.1
12	IN-FUR	ppmCO	5010.0	5136.3
10	IN-FUR	ppmNOx	0.0	4.7
10	IN-FUR	ppmNOx	3980.0	3906.4
11	IN-FUR	ppmNO	0.0	17.1
11	IN-FUR	ppmNO	3980.0	3952.6
9	IN-FUR	ppmSO2	0.0	14.6
9	IN-FUR	ppmSO2	847.9	820.4

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
~~16:18~~	~~11.01~~	~~8.55~~	~~1764.5~~	~~7.2~~	~~11.3~~	~~14.7~~
16:19	1.59	14.76	1664.8	16.4	35.3	14.7
16:20	3.28	13.03	102.0	30.9	42.8	14.6
16:21	3.87	12.62	9980.6	45.1	52.1	14.7
Average	2.91	13.5	3916	30.8	43.4	14.7

COMMENTS: END TEST AT INLET SECOND LOCATION

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: RECALIB NOX - NO - CO AND SO2 FOR LOWER RANGE

DATE : 03-08-1995 TIME: 17:24 - 18:09

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.15
13	STACK	% O2	11.07	11.10
13	STACK	% O2	20.06	20.14
14	STACK	% CO2	0.00	0.01
14	STACK	% CO2	5.26	5.32
14	STACK	% CO2	9.13	9.04
14	STACK	% CO2	18.02	18.06
12	STACK	ppmCO	0.0	0.7
12	STACK	ppmCO	30.1	29.0
12	STACK	ppmCO	60.0	58.4
12	STACK	ppmCO	90.0	89.4
10	STACK	ppmNOx	0.0	0.6
10	STACK	ppmNOx	46.7	47.6
10	STACK	ppmNOx	177.7	177.9
11	STACK	ppmNO	0.0	0.1
11	STACK	ppmNO	46.7	45.7
11	STACK	ppmNO	177.7	177.5
9	STACK	ppmSO2	0.0	0.0
9	STACK	ppmSO2	499.1	488.3
9	STACK	ppmSO2	847.9	847.3

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK

DATE : 03-08-1995 TIME: 18:11 - 18:21

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.16
13	STACK	% O2	11.07	10.99
14	STACK	% CO2	0.00	-0.00
14	STACK	% CO2	9.13	9.00
12	STACK	ppmCO	0.0	-0.4
12	STACK	ppmCO	60.0	58.8
10	STACK	ppmNOx	0.0	1.0
10	STACK	ppmNOx	46.7	45.2
11	STACK	ppmNO	0.0	0.3
11	STACK	ppmNO	46.7	45.5
9	STACK	ppmSO2	0.0	-0.3
9	STACK	ppmSO2	499.1	476.2

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
18:27	20.30	0.50	0.7	2.6	2.0	2.5
18:28	20.29	0.52	0.6	2.7	2.0	2.4
18:29	20.13	0.60	0.7	2.9	2.3	0.3
18:30	19.98	0.72	1.0	6.1	6.1	0.0
18:31	19.99	0.71	1.1	12.9	13.0	0.0
18:32	19.96	0.72	1.1	18.1	18.3	0.0
18:33	19.84	0.98	1.6	21.4	21.0	0.0
18:34	19.76	1.36	3.3	22.4	23.0	-0.1
18:35	19.35	1.44	3.2	26.5	26.5	1.0
18:36	19.51	1.41	3.0	23.8	17.3	2.6
18:37	19.73	1.47	3.5	25.1	21.7	1.6
18:38	20.53	0.39	0.9	14.5	11.1	-0.2
18:39	20.52	0.08	0.6	1.2	0.6	0.0
18:40	20.77	0.04	0.4	0.9	0.3	-0.2
18:41	20.55	0.34	0.4	1.5	1.1	-0.4
18:42	20.16	0.69	0.6	3.1	2.4	-0.2
18:43	20.14	0.65	0.7	2.8	2.2	-0.1
18:44	20.03	0.74	5.6	3.3	2.9	-0.1
18:45	20.00	0.83	7.1	4.5	3.9	-0.2
18:46	20.00	0.82	2.7	4.5	3.9	-0.4
18:47	20.00	0.79	1.1	4.3	3.7	-0.3
18:48	20.00	0.77	0.7	4.1	3.5	-0.2
18:49	20.00	0.75	0.7	4.0	3.3	-0.1
18:50	20.05	0.71	0.7	3.6	2.9	-0.2
18:51	20.13	0.65	0.7	3.4	2.7	-0.1
18:52	20.15	0.61	0.8	3.4	2.7	-0.2
18:53	20.13	0.60	0.8	3.4	2.7	-0.2
18:54	20.14	0.58	0.6	3.2	2.5	-0.1
18:55	20.14	0.56	0.6	3.0	2.3	-0.1
18:56	20.14	0.55	0.5	2.9	2.2	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
18:56	20.08	0.72	1.5	7.9	7.0	0.2
18:57	20.11	0.57	0.5	3.0	2.4	-0.4
18:58	20.04	0.61	0.5	3.4	2.7	-0.2
18:59	20.04	0.62	0.5	3.4	2.7	-0.0
19:00	20.06	0.61	0.5	3.2	2.5	-0.2
19:01	20.11	0.58	0.5	3.1	2.3	-0.2
19:02	20.11	0.56	0.5	3.0	2.2	-0.0
19:03	20.12	0.55	0.5	2.9	2.1	-0.2
19:04	20.13	0.53	0.6	2.8	2.1	-0.2
19:05	20.14	0.52	0.6	2.8	2.1	-0.1
19:06	20.14	0.51	0.5	2.7	1.9	-0.4
19:07	20.12	0.52	0.5	2.7	1.9	-0.1
19:08	20.11	0.53	0.5	2.9	2.1	-0.1
19:09	20.12	0.54	0.5	3.0	2.2	-0.3
19:10	20.13	0.52	0.8	2.9	2.1	-0.1
19:11	20.14	0.51	7.4	2.8	2.1	-0.2
19:12	20.15	0.49	16.2	2.8	2.0	-0.1
19:13	20.15	0.48	10.3	2.6	1.8	-0.0

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
19:14	20.15	0.46	6.1	2.5	1.7	-0.4
19:15	20.18	0.43	3.8	2.4	1.6	-0.1
19:16	20.30	0.38	2.2	2.3	1.4	-0.3
19:17	20.23	0.41	1.2	2.4	1.5	-0.0
19:18	20.15	0.48	1.2	2.7	1.9	-0.1
19:19	20.14	0.50	1.4	2.8	2.0	-0.0
19:20	20.15	0.49	0.9	2.6	1.8	-0.1
19:21	20.15	0.49	0.7	2.5	1.6	0.0
19:22	20.15	0.48	0.7	2.5	1.6	-0.2
19:23	20.17	0.44	0.7	2.4	1.6	-0.0
19:24	20.15	0.43	0.7	2.4	1.4	-0.2
19:25	20.15	0.44	0.7	2.3	1.4	-0.2
19:26	20.15	0.45	0.7	2.4	1.4	-0.2

AVERAGE VALUES FOR THE LAST 30 MINUTES

19:26	20.14	0.50	2.1	2.7	1.9	-0.2

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

19:26	20.11	0.61	1.8	5.3	4.5	0.0

19:27	20.15	0.45	0.7	2.4	1.4	-0.3
19:28	20.15	0.45	0.8	2.3	1.4	-0.3
19:29	20.15	0.44	0.9	2.3	1.4	-0.4
19:30	20.16	0.43	1.0	2.3	1.4	-0.1
19:31	20.20	0.42	1.1	2.3	1.4	-0.2
19:32	20.20	0.41	1.1	2.3	1.4	-0.2
19:33	20.16	0.44	1.0	2.3	1.4	-0.3
19:34	20.15	0.47	0.8	2.4	1.6	-0.2
19:35	20.15	0.48	0.8	2.5	1.6	-0.2
19:36	20.15	0.48	0.7	2.4	1.6	-0.2
19:37	20.15	0.47	0.7	2.4	1.4	-0.2
19:38	20.17	0.46	0.7	2.3	1.4	-0.3
19:39	20.19	0.45	0.7	2.3	1.4	-0.1
19:40	20.16	0.45	0.7	2.3	1.4	-0.1
19:41	20.15	0.53	0.7	2.4	1.5	-0.3
19:42	20.14	0.70	0.6	2.5	1.7	-0.3
19:43	20.03	0.88	0.6	3.1	2.3	-0.3
19:44	20.00	0.95	0.7	3.2	2.3	-0.2
19:45	20.00	0.95	0.7	3.1	2.2	-0.4
19:46	20.00	0.95	0.7	3.1	2.2	-0.4
19:47	20.00	0.95	0.7	3.1	2.2	-0.4
19:48	20.00	0.95	0.7	3.1	2.2	-0.2
19:49	20.00	0.95	0.7	3.2	2.4	-0.3
19:50	20.00	0.94	0.9	3.2	2.4	-0.2
19:51	20.01	0.95	0.9	3.3	2.5	-0.5
19:52	19.99	0.98	1.0	3.5	2.7	-0.1
19:53	19.99	1.02	0.9	3.8	2.9	-0.4
19:54	19.99	1.03	0.8	3.9	3.1	-0.4
19:55	19.99	1.03	0.7	4.1	3.3	-0.4
19:56	19.99	1.04	0.7	4.3	3.6	-0.2

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
19:56	20.09	0.70	0.8	2.9	2.0	-0.3
19:57	19.99	1.05	0.7	4.6	3.8	-0.1
19:58	19.99	1.08	0.7	4.9	4.2	-0.1
19:59	19.98	1.12	0.6	5.6	4.9	-0.2
20:00	19.96	1.15	0.5	6.3	5.6	-0.3
20:01	19.93	1.17	0.5	7.0	6.4	-0.4
20:02	19.91	1.17	0.7	7.7	7.0	-0.3
20:03	19.95	1.17	0.7	7.6	7.0	-0.2
20:04	19.93	1.16	0.6	7.4	6.8	-0.3
20:05	19.91	1.17	0.5	7.7	7.0	-0.4
20:06	19.88	1.18	0.5	8.2	7.5	-0.2
20:07	19.87	1.18	0.5	8.7	8.0	-0.2
20:08	19.86	1.18	0.5	9.1	8.3	-0.2
20:09	19.86	1.19	0.4	9.3	8.6	-0.3
20:10	19.85	1.19	0.4	9.3	8.6	-0.5
20:11	19.90	1.17	0.4	9.3	8.5	-0.2
20:12	20.00	1.14	0.4	7.7	6.8	-0.6
20:13	20.00	1.08	0.4	6.4	5.6	-0.3
20:14	20.04	0.89	0.4	5.3	4.3	-0.6
20:15	20.11	0.68	0.5	3.8	2.8	-0.4
20:16	20.15	0.55	0.5	3.1	2.1	-0.2
20:17	20.15	0.49	0.6	2.7	1.8	-0.3
20:18	20.14	0.49	0.6	2.7	1.8	-0.1
20:19	20.14	0.55	0.6	3.0	2.1	-0.2
20:20	20.15	0.50	0.6	2.8	1.9	-0.3
20:21	20.15	0.43	0.6	2.7	1.8	-0.3
20:22	20.15	0.38	0.6	2.7	1.7	-0.1
20:23	20.15	0.36	0.6	2.7	1.6	-0.2
20:24	20.14	0.34	0.6	2.6	1.6	-0.3
20:25	20.14	0.36	0.6	3.8	3.4	-0.2
20:26	20.02	0.55	0.6	8.2	7.3	-0.3
AVERAGE VALUES FOR THE LAST 30 MINUTES						
20:26	20.01	0.87	0.5	5.8	5.0	-0.3
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
20:26	20.05	0.79	0.7	4.3	3.5	-0.3
20:27	19.94	0.82	0.7	6.3	5.4	-0.2
20:28	19.86	0.98	0.7	6.1	5.4	-0.3
20:29	19.84	1.06	0.6	7.4	6.8	-0.3
20:30	19.83	1.11	0.6	8.8	8.1	-0.2
20:31	19.74	1.10	0.6	9.2	8.5	-0.3
20:32	19.73	1.12	0.6	9.7	9.0	-0.3
20:33	19.71	1.14	0.6	10.0	9.4	-0.2
20:34	19.69	1.16	0.6	10.3	9.7	-0.3
20:35	19.69	1.17	0.7	10.5	9.9	-0.3

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
20:36	19.69	1.19	0.6	10.5	9.8	-0.2
20:37	19.69	1.20	0.6	10.6	9.9	-0.3
20:38	19.69	1.23	0.7	10.6	10.0	-0.4
20:39	19.63	1.25	0.7	10.6	9.9	-0.2
20:40	19.63	1.28	0.7	10.6	10.1	-0.5
20:41	19.61	1.31	2.6	10.9	10.3	-0.3
20:42	19.59	1.36	4.4	11.1	10.5	-0.2
20:43	19.56	1.37	3.9	11.1	10.5	-0.4
20:44	19.57	1.35	2.0	11.1	10.6	-0.3
20:45	19.55	1.38	1.9	11.4	10.8	-0.2
20:46	19.54	1.40	2.7	11.4	10.8	-0.3
20:47	19.54	1.41	1.8	11.7	11.1	-0.3
20:48	19.56	1.41	1.4	12.2	11.6	-0.3
20:49	19.58	1.41	1.1	12.5	12.0	-0.4
20:50	19.54	1.39	0.9	12.6	12.0	-0.1
20:51	19.60	1.37	0.8	12.6	12.0	-0.2
20:52	19.62	1.38	1.5	12.6	12.0	-0.1
20:53	19.67	1.39	1.3	12.6	12.1	-0.1
20:54	19.68	1.40	1.9	12.7	12.1	-0.1
20:55	19.68	1.39	2.5	12.4	11.8	-0.5
20:56	19.69	1.36	1.3	12.0	11.5	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
20:56	19.66	1.26	1.4	10.7	10.1	-0.3
20:57	19.70	1.35	0.8	11.9	11.5	-0.4
20:58	19.71	1.35	0.7	12.1	11.7	-0.2
20:59	19.71	1.38	1.4	12.1	11.7	-0.9
21:00	19.71	1.40	1.2	12.0	11.7	-0.4
21:01	19.78	1.42	1.0	12.0	11.8	-0.2
21:02	19.76	1.43	1.2	12.3	12.1	-0.1
21:03	19.81	1.43	3.1	12.2	12.0	-0.3
21:04	19.82	1.43	4.2	12.2	12.0	-0.1
21:05	19.83	1.43	2.8	12.0	11.9	-0.8
21:06	19.83	1.42	2.5	12.0	11.9	-0.1
21:07	19.84	1.42	1.5	12.0	11.9	-0.7
21:08	19.84	1.44	2.0	11.9	11.9	-0.3
21:09	19.84	1.45	2.9	11.8	11.7	-0.4
21:10	19.85	1.44	1.9	11.3	11.3	-0.9
21:11	19.88	1.43	1.0	11.0	11.0	-0.6
21:12	19.95	1.43	0.9	10.8	10.8	-0.3
21:13	19.99	1.42	0.8	10.6	10.6	-0.9
21:14	20.00	1.42	0.7	10.3	10.3	-1.3
21:15	20.01	1.41	0.8	10.0	10.1	-0.9
21:16	20.03	1.40	1.0	9.8	9.9	-1.7
21:17	20.03	1.40	1.6	10.0	10.2	-2.4
21:18	20.06	1.41	2.9	10.2	10.3	-1.4
21:19	20.07	1.40	3.4	9.9	10.0	-1.4
21:20	20.12	1.39	2.6	9.3	9.4	-0.7
21:21	20.14	1.35	3.1	8.7	8.9	-0.2
AVERAGE 2056-2121	19.89	1.40	1.8	10.7	11.0	-0.0
AVERAGE 1827-2121	20.0	0.93	1.43	6.77	6.33	

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: POST TEST SYSTEM BIAS CHECK

DATE : 03-08-1995 TIME: 21:22 - 21:36

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.15
13	STACK	% O2	11.07	11.05
14	STACK	% CO2	0.00	0.01
14	STACK	% CO2	9.13	8.95
12	STACK	ppmCO	0.0	0.7
12	STACK	ppmCO	60.0	58.5
10	STACK	ppmNOx	0.0	-0.1
10	STACK	ppmNOx	46.7	46.2
11	STACK	ppmNO	0.0	0.3
11	STACK	ppmNO	46.7	45.6
9	STACK	ppmSO2	0.0	-0.1
9	STACK	ppmSO2	499.1	469.1

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: HC SYSTEM BIAS

DATE : 03-08-1995 TIME: 22:54 - 22:57

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
7	FUROUT	ppmC1	0.0	1.3
7	FUROUT	ppmC1	51.0	51.1

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 FUROUT % O2	CHAN14 FUROUT % CO2	CHAN12 FUROUT ppmCO	CHAN10 FUROUT ppmNOx	CHAN11 FUROUT ppmNO	CHAN 9 FUROUT ppmSO2	CHAN 7 FUROUT ppmCl
23:10	2.58	25.01	27.6	5.9	144.4	0.0	30.2
23:11	1.88	25.01	4.7	7.3	160.0	0.3	6.1

COMMENTS: END TEST
LINE CLOGGED AFTER 3 MINUTES OF SAMPLING

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYTEM BIAS CHECK AT STACK

DATE : 03-08-1995 TIME: 23:34 - 23:46

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.15
13	STACK	% O2	11.07	11.02
14	STACK	% CO2	0.00	0.04
14	STACK	% CO2	9.13	8.91
12	STACK	ppmCO	0.0	-0.3
12	STACK	ppmCO	60.0	58.4
10	STACK	ppmNOx	0.0	-0.3
10	STACK	ppmNOx	46.7	45.1
11	STACK	ppmNO	0.0	0.3
11	STACK	ppmNO	46.7	44.4

US BUREAU OF MINES - ALBANY OREGON 03-08-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
23:49	19.99	1.48	2.0	11.0	11.3	-0.2
23:50	19.99	1.48	1.5	11.0	11.3	-0.2
23:51	19.99	1.48	1.3	11.0	11.2	-0.2
23:52	19.99	1.48	1.2	11.0	11.1	-0.2
23:53	19.99	1.48	1.7	10.9	11.0	-0.1
23:54	20.00	1.47	1.7	11.0	11.0	-0.2
23:55	19.99	1.46	1.8	10.9	10.9	-0.2
23:56	19.99	1.48	3.2	11.1	11.1	-0.2
23:57	19.99	1.51	3.0	11.3	11.3	-0.0
23:58	19.99	1.51	2.0	11.2	11.2	-0.1
23:59	19.99	1.52	1.9	11.2	11.2	-0.2
24:00	20.00	1.51	1.7	11.4	11.4	-0.2
00:01	19.99	1.51	3.4	11.4	11.4	-0.2
00:02	19.99	1.50	3.2	11.3	11.3	-0.2
00:03	19.99	1.50	1.8	11.2	11.2	-0.3
00:04	19.99	1.50	1.3	11.3	11.3	-0.2
00:05	19.99	1.50	1.1	11.3	11.2	-0.2
00:06	19.99	1.50	1.1	11.2	11.0	-0.1
00:07	19.99	1.49	2.3	11.0	10.9	-0.1
00:08	20.00	1.48	7.1	10.8	10.7	-0.2
00:09	20.01	1.45	3.4	10.7	10.7	-0.2
00:10	20.01	1.44	1.7	10.7	10.6	-0.2
00:11	20.01	1.45	1.8	10.7	10.5	0.0
00:12	20.01	1.45	2.1	10.5	10.3	-0.0
00:13	20.03	1.43	2.4	10.3	10.2	-0.2
00:14	20.02	1.43	2.6	10.3	10.2	-0.3
00:15	20.01	1.45	2.4	10.5	10.4	-0.2
00:16	20.02	1.45	2.0	10.4	10.3	-0.3
00:17	20.03	1.45	1.5	10.3	10.3	-0.2
00:18	20.03	1.45	1.4	10.5	10.4	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
00:18	20.00	1.48	2.2	10.9	10.9	-0.2
00:19	20.05	1.43	1.4	10.4	10.3	-0.1
00:20	20.07	1.43	1.3	10.5	10.4	-0.2
00:21	20.04	1.43	1.2	10.6	10.6	-0.1
00:22	20.03	1.44	1.2	10.8	10.7	0.0
00:23	20.01	1.44	1.2	10.6	10.5	-0.1
00:24	20.02	1.45	1.2	10.5	10.4	-0.1
00:25	20.02	1.45	1.2	10.4	10.3	-0.0
00:26	20.03	1.44	1.1	10.4	10.3	-0.2
00:27	20.04	1.43	1.1	10.3	10.3	-0.2
00:28	20.04	1.43	1.0	10.3	10.2	-0.2
00:29	20.03	1.44	1.0	10.3	10.2	-0.1
00:30	20.03	1.44	1.0	10.5	10.3	-0.2
00:31	20.03	1.42	1.0	10.5	10.3	-0.1
00:32	20.03	1.43	2.7	10.5	10.4	-0.2
00:33	20.02	1.43	10.8	10.7	10.5	-0.2
00:34	20.03	1.43	6.0	10.6	10.5	-0.3
00:35	20.01	1.44	2.1	10.7	10.6	-0.1

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
00:36	20.01	1.44	2.2	10.8	10.8	-0.2
00:37	20.02	1.43	6.3	10.9	10.7	-0.2
00:38	20.01	1.41	3.2	10.6	10.4	-0.1
00:39	20.02	1.41	1.4	10.5	10.3	-0.2
00:40	20.03	1.41	0.9	10.4	10.2	-0.2
00:41	20.01	1.41	0.8	10.4	10.2	-0.2
00:42	20.02	1.42	0.8	10.4	10.2	-0.2
00:43	20.03	1.43	4.6	10.5	10.4	-0.3
00:44	20.03	1.42	4.3	10.4	10.2	-0.4
00:45	20.04	1.39	2.3	10.2	10.0	-0.4
00:46	20.06	1.37	2.5	10.1	9.9	-0.1
00:47	20.06	1.37	2.6	10.1	9.9	-0.1
00:48	20.05	1.38	2.8	10.0	9.8	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
00:48	20.03	1.42	2.4	10.5	10.3	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
00:48	20.02	1.45	2.3	10.7	10.6	-0.2
00:49	20.01	1.38	2.4	9.9	9.7	-0.2
00:50	20.00	1.38	1.6	9.9	9.6	-0.2
00:51	20.00	1.36	1.3	9.8	9.6	-0.2
00:52	20.00	1.34	1.1	9.7	9.5	-0.2
00:53	20.01	1.33	1.1	9.6	9.3	-0.1
00:54	20.01	1.32	1.5	9.5	9.3	-0.2
00:55	20.00	1.32	1.2	9.4	9.1	-0.0
00:56	20.00	1.31	1.0	9.4	9.2	-0.1
00:57	20.00	1.30	1.0	9.5	9.2	-0.2
00:58	20.00	1.30	1.0	9.5	9.2	-0.2
00:59	19.99	1.31	0.8	9.4	9.1	-0.1
01:00	20.00	1.30	0.6	9.3	9.0	-0.2
01:01	20.00	1.30	0.6	9.3	9.0	-0.3
01:02	20.00	1.31	0.6	9.3	9.0	-0.1
01:03	19.99	1.31	0.6	9.3	8.9	-0.2
01:04	20.00	1.31	0.6	9.2	8.9	-0.2
01:05	19.99	1.29	0.6	9.1	8.8	-0.2
01:06	19.99	1.29	0.6	8.9	8.6	-0.2
01:07	19.99	1.28	0.5	8.8	8.5	-0.1
01:08	19.99	1.26	0.5	8.6	8.2	-0.2
01:09	19.99	1.25	0.5	8.1	7.7	-0.1
01:10	20.01	1.20	0.5	7.5	7.0	-0.2
01:11	20.12	1.09	0.5	6.3	5.6	-0.2
01:12	20.14	0.93	0.5	4.7	4.0	-0.2
01:13	20.16	0.76	0.6	3.5	2.9	-0.2
01:14	20.15	0.71	0.6	3.0	2.6	-0.2
01:15	20.15	0.82	0.6	3.6	3.5	-0.0
01:16	20.09	0.97	0.6	5.0	4.9	-0.2
01:17	20.02	1.10	0.5	6.4	6.2	-0.2
01:18	20.00	1.19	0.5	7.5	7.2	-0.2

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
01:18	20.03	1.21	0.8	8.1	7.8	-0.2
01:19	20.00	1.23	0.5	8.1	7.8	-0.1
01:20	19.99	1.26	0.5	8.4	8.1	-0.2
01:21	19.99	1.27	0.5	8.6	8.2	-0.2
01:22	19.99	1.28	0.5	8.7	8.3	-0.2
01:23	19.99	1.29	0.5	8.9	8.5	-0.2
01:24	19.99	1.29	0.5	9.1	8.8	-0.2
01:25	19.99	1.31	0.5	9.3	8.9	-0.0
01:26	19.95	1.32	0.5	9.4	9.0	-0.3
01:27	19.89	1.32	0.5	9.6	9.2	-0.2
01:28	19.96	1.32	0.5	9.8	9.3	-0.1
01:29	19.97	1.31	0.5	9.9	9.5	-0.2
01:30	19.99	1.31	0.5	9.9	9.4	-0.2
01:31	19.98	1.31	0.5	9.7	9.2	-0.1
01:32	19.98	1.31	0.5	9.7	9.2	-0.2
01:33	19.94	1.31	0.4	9.7	9.3	-0.2
01:34	19.92	1.31	0.5	9.6	9.2	-0.3
01:35	19.95	1.32	0.5	9.8	9.4	-0.2
01:36	19.96	1.34	0.7	9.9	9.5	-0.3
01:37	19.93	1.36	0.7	9.9	9.5	-0.1
01:38	19.97	1.39	0.7	10.0	9.6	-0.2
01:39	19.96	1.39	0.7	10.0	9.7	-0.1
01:40	19.95	1.40	1.3	10.1	9.7	-0.1
01:41	19.98	1.42	6.2	9.9	9.5	-0.2
01:42	19.99	1.42	3.4	10.0	9.7	-0.2
01:43	19.99	1.43	1.4	10.1	9.7	-0.2
01:44	19.99	1.43	1.1	10.1	9.9	-0.2
01:45	19.99	1.41	0.8	10.3	10.0	-0.1
01:46	19.99	1.40	0.7	10.3	10.1	-0.2
01:47	19.99	1.40	0.8	10.4	10.1	-0.2
01:48	20.00	1.39	2.4	10.2	9.9	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
01:48	19.97	1.34	1.0	9.7	9.3	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
01:48	20.00	1.28	0.9	8.9	8.5	-0.2
01:49	19.99	1.40	3.2	10.0	9.9	0.0
01:50	19.99	1.44	1.7	10.4	10.1	-0.1
01:51	19.95	1.42	1.0	9.7	9.4	-0.1
01:52	19.89	1.43	4.4	9.9	9.8	-0.1
01:53	19.90	1.46	4.0	10.4	10.2	-0.2
01:54	19.90	1.46	1.9	10.4	10.1	-0.2
01:55	19.91	1.46	1.0	10.3	10.1	-0.1
01:56	19.91	1.46	1.0	10.5	10.2	-0.1
01:57	19.90	1.45	1.4	10.3	10.1	-0.2

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
01:58	19.86	1.45	1.0	10.4	10.2	-0.1
01:59	19.85	1.44	0.9	10.4	10.1	-0.4
02:00	19.88	1.43	1.0	10.3	10.1	-0.1
02:01	19.87	1.41	1.0	10.4	10.2	-0.1
02:02	19.87	1.42	0.8	10.4	10.1	-0.3
02:03	19.86	1.42	0.7	10.4	10.1	-0.1
02:04	19.86	1.41	0.9	10.3	10.0	-0.2
02:05	19.86	1.40	1.4	10.2	9.9	-0.1
02:06	19.87	1.41	0.8	10.3	10.0	-0.1
02:07	19.86	1.43	0.6	10.3	10.1	-0.2
02:08	19.84	1.43	0.6	10.5	10.2	-0.2
02:09	19.84	1.42	0.7	10.5	10.2	-0.4
02:10	19.84	1.41	0.7	10.5	10.1	-0.2
02:11	19.84	1.40	1.8	10.1	9.8	-0.1
02:12	19.84	1.40	1.3	10.2	10.0	-0.2
02:13	19.84	1.40	0.7	10.4	10.1	-0.2
02:14	19.84	1.40	0.6	10.6	10.3	-0.1
02:15	19.83	1.41	0.7	10.6	10.3	-0.2
02:16	19.83	1.42	1.0	10.7	10.4	-0.2
02:17	19.82	1.43	0.8	10.7	10.4	-0.1
02:18	19.83	1.44	0.7	10.9	10.6	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
02:18	19.87	1.42	1.3	10.4	10.1	-0.2
02:19	19.83	1.46	0.8	11.1	10.8	-0.2
02:20	19.74	1.49	1.3	11.6	11.4	-0.1
02:21	19.70	1.52	2.9	11.9	11.6	-0.2
02:22	19.74	1.54	2.7	12.2	11.8	-0.2
02:23	19.71	1.56	2.0	12.5	12.2	-0.2
02:24	19.71	1.56	1.3	12.6	12.2	-0.3
02:25	19.69	1.55	4.0	12.5	12.1	-0.1
02:26	19.69	1.54	2.6	12.4	12.0	-0.2
02:27	19.71	1.54	1.6	12.4	12.0	-0.1
02:28	19.72	1.53	1.0	12.5	12.1	-0.2
02:29	19.70	1.52	0.8	12.5	12.1	-0.0
02:30	19.69	1.53	1.6	12.6	12.3	-0.1
02:31	19.69	1.53	8.9	12.8	12.3	-0.2
02:32	19.69	1.53	5.1	12.7	12.3	-0.1
02:33	19.69	1.54	1.8	12.9	12.4	-0.1
02:34	19.68	1.55	1.1	12.9	12.4	-0.3
02:35	19.69	1.55	1.2	12.8	12.3	-0.1
02:36	19.69	1.55	1.7	12.7	12.3	-0.1
02:37	19.69	1.59	1.1	13.1	12.9	-0.3
02:38	19.64	1.59	0.8	13.8	13.5	-0.1
02:39	19.53	1.61	13.0	13.8	13.2	-0.2
02:40	19.45	1.67	97.1	11.9	11.0	-0.2
02:41	19.35	1.70	99.8	14.7	17.0	-0.0
02:42	19.19	1.71	99.8	29.6	32.5	-0.2
02:43	19.05	1.71	99.8	37.8	37.9	-0.1
02:44	18.98	1.69	99.8	36.0	35.2	-0.1

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
02:45	18.95	1.62	99.8	31.4	30.5	-0.1
02:46	18.98	1.56	99.8	27.0	26.4	-0.1
02:47	18.98	1.55	99.8	24.2	23.9	-0.1
02:48	19.10	1.47	99.8	22.1	21.2	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
02:48	19.52	1.57	31.8	16.6	16.4	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
02:48	19.70	1.50	16.5	13.5	13.3	-0.2
02:49	19.49	1.39	99.8	16.9	16.1	-0.2
02:50	19.68	1.53	99.8	15.4	15.2	-0.2
02:51	19.69	1.58	77.7	14.9	14.6	-0.1
02:52	19.71	1.56	19.1	14.1	13.8	-0.1
02:53	19.74	1.53	6.4	13.7	13.5	-0.2
02:54	19.75	1.53	3.9	13.5	13.3	-0.1
02:55	19.77	1.53	3.0	13.2	13.1	-0.1
02:56	19.74	1.52	2.4	13.3	13.2	-0.1
02:57	19.74	1.50	2.1	13.3	13.1	-0.1
02:58	19.75	1.51	1.9	13.2	13.1	-0.1
02:59	19.74	1.52	1.7	13.4	13.3	-0.2
03:00	19.78	1.52	2.2	13.4	13.2	-0.3
03:01	19.76	1.53	3.7	13.3	13.1	-0.1
03:02	19.73	1.53	2.3	13.2	13.1	-0.1
03:03	19.72	1.55	1.5	13.3	13.1	-0.2
03:04	19.71	1.57	1.2	13.3	13.2	-0.1
03:05	19.72	1.56	1.2	13.4	13.2	0.0
03:06	19.73	1.55	1.0	13.3	13.1	-0.0
03:07	19.70	1.54	2.5	13.2	13.1	-0.2
03:08	19.70	1.55	8.6	13.4	13.2	-0.2
03:09	19.69	1.54	4.4	13.4	13.3	-0.2
03:10	19.69	1.54	1.5	13.6	13.3	-0.4
03:11	19.70	1.54	1.1	13.4	13.1	-0.3
03:12	19.69	1.53	0.9	13.2	13.0	-0.2
03:13	19.69	1.51	0.7	13.3	13.1	-0.3
03:14	19.69	1.50	0.7	13.3	13.1	-0.3
03:15	19.69	1.48	0.7	13.3	13.0	-0.2
03:16	19.69	1.46	0.6	13.0	12.6	-0.1
03:17	19.69	1.44	0.7	12.6	12.2	-0.3
03:18	19.69	1.43	0.8	12.4	12.1	-0.0
AVERAGE VALUES FOR THE LAST 30 MINUTES						
03:18	19.71	1.52	11.8	13.5	13.3	-0.2
03:19	19.69	1.44	0.6	12.8	12.4	-0.0
03:20	19.67	1.45	0.6	12.8	12.4	-0.1
03:21	19.66	1.45	0.6	12.7	12.3	-0.1
03:22	19.68	1.45	0.5	12.6	12.2	-0.2
03:23	19.68	1.43	0.5	12.5	12.1	-0.1

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
03:24	19.69	1.43	0.5	12.3	11.8	-0.1
03:25	19.69	1.41	0.5	11.9	11.5	-0.2
03:26	19.69	1.39	0.5	11.7	11.3	-0.1
03:27	19.69	1.33	0.6	11.4	10.9	-0.2
03:28	19.69	1.24	0.5	10.6	10.0	-0.1
03:29	19.76	1.13	0.9	9.2	8.4	-0.2
03:30	19.84	1.00	1.5	7.4	6.5	-0.0
03:31	19.77	0.92	1.1	5.9	5.2	-0.1
03:32	19.69	0.91	1.2	5.4	4.9	-0.2
03:33	19.66	0.91	2.6	5.3	4.8	-0.2
03:34	19.57	0.91	19.4	5.0	4.4	-0.1
03:35	19.57	0.90	47.8	4.6	4.1	-0.2
03:36	19.60	0.86	25.6	4.4	4.0	-0.0
03:37	19.64	0.85	21.5	4.5	4.1	-0.2
03:38	19.68	0.81	27.0	5.0	4.6	-0.3
03:39	19.69	0.79	7.1	5.2	4.8	-0.2
03:40	19.68	0.78	2.1	5.2	4.6	-0.4
03:41	19.69	0.75	1.3	5.0	4.5	-0.2
03:42	19.69	0.74	1.2	5.0	4.4	-0.1
03:43	19.69	0.73	1.0	4.9	4.4	-0.2
03:44	19.69	0.72	1.0	4.8	4.2	-0.2
03:45	19.69	0.72	1.1	4.6	4.1	-0.3
03:46	19.69	0.72	0.9	4.6	4.0	-0.2
03:47	19.69	0.72	0.7	4.5	4.0	-0.3
03:48	19.69	0.72	0.7	4.6	4.0	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
03:48	19.68	1.02	5.7	7.6	7.0	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
03:48	19.70	1.27	8.8	10.5	10.2	-0.2

COMMENTS: END DATA COLLECTION 2349-0348

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK AT STACK

DATE : 03-09-1995 TIME: 03:49 - 04:11

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.15
13	STACK	% O2	11.07	10.99
14	STACK	% CO2	0.00	-0.00
14	STACK	% CO2	9.13	8.88
12	STACK	ppmCO	0.0	0.2
12	STACK	ppmCO	60.0	58.3
10	STACK	ppmNOx	0.0	0.7
10	STACK	ppmNOx	46.7	44.1
11	STACK	ppmNO	0.0	0.0
11	STACK	ppmNO	46.7	44.1

04:17	18.95	1.61	99.8	17.4	17.9	-0.2
04:18	18.96	1.67	99.8	19.3	19.6	-0.1
04:19	18.96	1.68	99.8	19.4	19.5	-0.2
04:20	18.95	1.69	99.8	18.8	18.8	-0.3
04:21	18.95	1.69	99.8	18.2	18.3	-0.1
04:22	18.95	1.67	99.8	17.4	17.4	-0.3
04:23	18.94	1.67	99.8	16.4	16.4	-0.2
04:24	18.94	1.67	99.8	15.4	15.4	-0.1
04:25	18.94	1.67	99.8	14.7	14.7	-0.1
04:26	18.95	1.67	99.8	14.1	14.1	-0.1
04:27	18.95	1.67	99.8	13.5	13.5	-0.1
04:28	18.95	1.67	99.8	12.9	12.9	-0.2
04:29	18.94	1.67	99.8	12.4	12.4	-0.1
04:30	18.94	1.66	99.8	12.0	12.0	-0.1
04:31	18.96	1.65	99.8	11.6	11.6	-0.4
04:32	18.96	1.65	99.8	11.2	11.2	-0.1
04:33	18.97	1.65	99.8	11.0	10.9	-0.1
04:34	18.97	1.65	99.8	10.8	10.7	-0.1
04:35	18.98	1.66	99.8	10.7	10.7	-0.1
04:36	18.98	1.66	99.8	10.6	10.5	-0.1
04:37	18.94	1.65	99.8	10.4	10.3	-0.1
04:38	18.93	1.64	99.8	10.1	10.0	-0.1
04:39	18.93	1.65	99.8	9.9	9.8	-0.4
04:40	18.93	1.65	99.8	9.7	9.6	-0.0
04:41	18.94	1.65	99.8	9.5	9.4	-0.3
04:42	18.94	1.65	99.8	9.3	9.1	-0.3
04:43	18.93	1.64	99.8	9.1	8.9	-0.2
04:44	18.94	1.64	99.8	8.9	8.7	-0.4
04:45	18.93	1.64	99.8	8.7	8.5	-0.2
04:46	18.93	1.64	99.8	8.6	8.5	-0.1

AVERAGE VALUES FOR THE LAST 30 MINUTES

04:46	18.95	1.66	99.8	12.7	12.7	-0.2

04:47	18.94	1.64	99.8	8.5	8.3	-0.2
04:48	18.93	1.64	99.8	8.4	8.2	-0.3
04:49	18.93	1.65	99.8	8.3	8.1	-0.2
04:50	18.93	1.64	99.8	8.2	8.0	-0.2
04:51	18.92	1.63	99.8	8.1	7.9	-0.2
04:52	18.92	1.63	99.8	7.9	7.7	-0.1
04:53	18.93	1.63	99.8	7.8	7.6	-0.0
04:54	18.93	1.61	99.8	7.1	6.6	-0.1
04:55	18.93	1.61	99.8	6.3	6.0	-0.2
04:56	18.93	1.61	99.8	6.0	5.6	-0.2
04:57	18.93	1.61	99.8	5.6	5.3	-0.1
04:58	18.94	1.61	99.8	5.8	5.6	-0.1
04:59	18.93	1.61	99.8	6.0	5.8	-0.2
05:00	18.92	1.62	99.8	6.3	6.1	-0.1
05:01	18.92	1.62	99.8	6.5	6.3	-0.1
05:02	18.93	1.61	99.8	6.7	6.5	-0.1

COMMENTS: SPAN CO CHECK

(CONTINUED ON THE NEXT PAGE)

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: US BUREAU OF MINES - ALBANY OREGON

DATE: 03-09-1995 TIME: 05:05

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
13	STACK	% O2	25	0.10 V	0%
14	STACK	% CO2	20	1.00 V	0%
12	STACK	ppmCO	1000	10.00 V	0%
10	STACK	ppmNOx	250	10.00 V	0%
11	STACK	ppmNO	200	10.00 V	0%
9	STACK	ppmSO2	5000	10.00 V	0%

AVERAGING PERIODS: 30 MINUTES, ONE HOUR,
NO EMISSION RATE CALCULATIONS

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
05:27	19.07	1.61	998.3	6.7	6.7	-0.2
05:28	19.08	1.62	998.3	6.6	6.6	-0.1
05:29	19.04	1.64	998.4	6.5	6.5	-0.2
05:30	18.93	1.69	998.3	6.5	6.6	-0.1
05:31	18.87	1.71	998.3	6.5	6.5	-0.2
05:32	18.84	1.71	998.3	6.4	6.4	-0.2
05:33	18.85	1.70	998.4	6.4	6.4	-0.1
05:34	18.89	1.68	998.3	5.7	5.4	-0.2
05:35	18.90	1.69	998.3	5.1	5.1	-0.2
05:36	18.91	1.69	998.3	5.3	5.1	-0.2
05:37	18.90	1.69	998.3	4.7	4.6	-0.2
05:38	18.86	1.70	998.3	4.7	4.5	-0.1
05:39	18.86	1.71	998.3	4.6	4.6	-0.4
05:40	18.87	1.71	998.3	4.9	4.9	-0.1
05:41	18.88	1.71	998.3	5.1	5.1	-0.1
05:42	18.86	1.72	998.3	5.3	5.4	-0.1
05:43	18.87	1.72	998.3	5.6	5.7	-0.3
05:44	18.84	1.70	998.3	5.8	5.8	-0.3
05:45	18.82	1.70	998.3	6.0	6.0	-0.3
05:46	18.84	1.71	998.3	6.1	6.2	-0.2
05:47	18.83	1.71	998.2	6.3	6.4	-0.1
05:48	18.83	1.71	998.3	6.4	6.5	-0.1
05:49	18.83	1.71	998.3	6.5	6.6	-0.3
05:50	18.84	1.72	998.3	6.5	6.7	-0.4
05:51	18.84	1.71	998.2	6.6	6.7	-0.2
05:52	18.83	1.72	998.3	6.6	6.6	-0.0
05:53	18.80	1.72	998.3	6.5	6.6	-0.2
05:54	18.81	1.73	998.3	6.5	6.6	-0.4
05:55	18.80	1.74	998.3	6.5	6.6	-0.3
05:56	18.81	1.74	998.3	6.6	6.7	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
05:56	18.87	1.70	998.3	6.0	6.0	-0.2
05:57	18.81	1.74	998.3	6.5	6.6	-0.1
05:58	18.82	1.72	998.2	6.4	6.5	-0.1
05:59	18.82	1.72	998.3	6.4	6.4	-0.2
06:00	18.83	1.72	998.3	6.3	6.3	-0.2

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
06:02	18.79	1.73	998.2	6.2	6.2	-0.1

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: US BUREAU OF MINES - ALBANY OREGON

DATE: 03-09-1995 TIME: 06:02

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
13	STACK	% O2	25	0.10 V	0%
14	STACK	% CO2	20	1.00 V	0%
12	STACK	ppmCO	10000	10.00 V	0%
10	STACK	ppmNOx	250	10.00 V	0%
11	STACK	ppmNO	200	10.00 V	0%
9	STACK	ppmSO2	5000	10.00 V	0%

AVERAGING PERIODS: 30 MINUTES, ONE HOUR,
NO EMISSION RATE CALCULATIONS

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: DIRECT CALIBRATION ERROR CO

DATE : 03-09-1995 TIME: 06:03 - 06:27

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
12	STACK	ppmCO	0.0	1.5
12	STACK	ppmCO	2999.0	3005.7
12	STACK	ppmCO	5010.0	5007.1
12	STACK	ppmCO	7995.0	8039.4

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK CO

DATE : 03-09-1995 TIME: 06:28 - 06:34

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
12	STACK	ppmCO	0.0	1.8
12	STACK	ppmCO	5010.0	5016.5

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TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
06:42	18.60	1.67	4092.4	4.9	4.8	-0.3
06:43	18.72	1.68	4107.5	4.8	4.9	-0.2
06:44	18.69	1.69	4257.4	4.8	5.0	-0.2
06:45	18.71	1.69	4448.3	4.8	5.0	-0.2
06:46	18.74	1.68	4431.0	4.8	5.0	-0.2
06:47	18.76	1.68	4406.2	4.7	4.6	-0.1
06:48	18.76	1.67	4314.1	3.8	3.7	-0.1
06:49	18.74	1.69	4300.7	3.7	3.7	-0.2
06:50	18.73	1.72	4326.0	4.0	4.0	-0.1
06:51	18.74	1.71	4280.8	4.1	4.2	-0.3
06:52	18.76	1.70	4044.0	4.2	4.3	-0.2
06:53	18.76	1.70	4016.6	4.3	4.4	-0.2
06:54	18.77	1.72	4097.5	4.4	4.6	-0.1
06:55	18.77	1.72	4185.1	4.5	4.7	-0.2
06:56	18.76	1.71	4241.1	4.6	4.8	-0.2
06:57	18.77	1.70	4195.1	4.7	4.9	-0.1
06:58	18.77	1.71	4270.6	4.8	5.0	-0.2
06:59	18.77	1.70	4160.8	4.8	5.0	-0.1
07:00	18.77	1.70	4083.3	4.8	5.0	-0.3
07:01	18.77	1.69	4099.3	4.8	5.0	-0.2
07:02	18.77	1.69	4119.4	4.8	5.0	-0.1
07:03	18.77	1.68	4133.9	4.8	5.0	-0.2
07:04	18.81	1.67	4098.1	4.9	5.0	-0.2
07:05	19.62	1.00	3144.3	3.6	3.2	-0.2
07:06	19.85	0.84	1686.4	2.3	2.3	-0.2
07:07	19.85	0.85	1661.3	2.3	2.3	-0.2
07:08	19.84	0.85	1659.7	2.3	2.3	-0.2
07:09	19.84	0.83	1618.1	2.3	2.2	-0.2
07:10	19.90	0.76	1501.9	2.2	2.2	-0.2
07:11	20.09	0.62	1116.4	2.0	1.9	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES						
07:11	19.01	1.49	3636.6	4.1	4.1	-0.2
07:12	20.15	0.56	592.0	1.8	1.7	-0.2
07:13	20.15	0.53	387.0	1.7	1.5	-0.2
07:14	20.15	0.50	290.8	1.6	1.4	-0.3
07:15	20.15	0.48	233.2	1.5	1.3	-0.2
07:16	20.13	0.49	258.4	1.5	1.2	-0.2
07:17	20.11	0.48	359.0	1.4	1.1	-0.3
07:18	20.08	0.48	328.2	1.4	1.1	-0.3
07:19	20.10	0.48	347.5	1.4	1.0	-0.0
07:20	20.03	0.48	387.0	1.4	1.0	-0.1
07:21	20.01	0.48	420.7	1.3	1.0	-0.2
07:22	20.02	0.47	429.0	1.3	1.0	-0.3
07:23	20.01	0.47	428.4	1.3	0.9	-0.2
07:24	20.00	0.48	418.6	1.3	1.0	-0.1
07:25	20.01	0.47	409.8	1.3	0.9	-0.3
07:26	20.01	0.47	409.5	1.3	0.9	-0.1
07:27	20.00	0.47	405.3	1.3	0.9	-0.1
07:28	20.00	0.48	399.4	1.4	0.9	-0.3
07:29	20.01	0.47	385.6	1.4	0.9	-0.2
07:30	20.01	0.46	380.8	1.3	0.9	-0.2
07:31	20.00	0.46	373.8	1.3	0.9	-0.2
07:32	20.00	0.46	373.9	1.3	0.9	-0.1

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
07:33	20.00	0.46	371.8	1.3	0.9	-0.2
07:34	20.00	0.47	370.1	1.3	0.9	-0.1
07:35	19.99	0.47	368.6	1.3	0.9	-0.2
07:36	19.99	0.47	361.5	1.3	0.9	-0.1
07:37	19.99	0.47	355.0	1.4	0.9	-0.2
07:38	19.99	0.47	348.5	1.4	0.9	-0.2
07:39	19.99	0.47	344.5	1.4	0.9	-0.1
07:40	20.00	0.47	340.1	1.4	0.9	-0.2
07:41	20.00	0.46	321.1	1.5	1.0	-0.3
AVERAGE VALUES FOR THE LAST 30 MINUTES						
07:41	20.04	0.48	373.3	1.4	1.0	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
07:41	19.52	0.98	2004.9	2.7	2.6	-0.2

COMMENTS:

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
07:49	20.00	0.45	48.3	2.1	1.7	-0.2
07:50	19.99	0.46	35.2	2.2	1.9	-0.2
07:51	20.01	0.46	13.8	2.3	1.9	-0.1
07:52	20.01	0.46	3.7	2.2	1.9	-0.3
07:53	20.00	0.46	1.5	2.2	1.9	-0.1
07:54	20.00	0.47	1.7	2.3	2.0	-0.2
07:55	20.01	0.47	1.4	2.5	2.2	-0.1
07:56	20.01	0.46	2.0	2.6	2.3	-0.2
07:57	20.02	0.46	1.1	2.6	2.4	-0.2
07:58	20.01	0.46	2.0	2.7	2.4	-0.2
07:59	20.01	0.45	1.8	2.5	2.2	-0.1
08:00	20.03	0.45	2.3	2.5	2.2	-0.2
08:01	20.05	0.44	1.3	2.4	2.1	-0.2
08:02	20.03	0.44	1.5	2.4	2.1	-0.2
08:03	20.03	0.45	2.0	2.4	2.1	-0.2
08:04	20.03	0.45	6.5	2.3	2.1	-0.3
08:05	20.02	0.44	12.2	2.3	2.1	-0.2
08:06	20.04	0.45	3.7	2.3	2.1	-0.1
08:07	20.04	0.45	1.2	2.4	2.1	-0.1
08:08	20.05	0.45	2.2	2.4	2.1	-0.2
08:09	20.06	0.44	2.1	2.4	2.1	-0.2
08:10	20.07	0.44	1.4	2.4	2.1	-0.1
08:11	20.07	0.44	2.0	2.4	2.0	-0.2
08:12	20.07	0.44	2.3	2.4	2.1	-0.2
08:13	20.05	0.45	1.7	2.4	2.1	-0.3
08:14	20.04	0.45	1.5	2.4	2.1	-0.2
08:15	20.02	0.45	1.9	2.4	2.1	-0.1
08:16	20.04	0.45	0.8	2.4	2.1	-0.3
08:17	20.04	0.45	1.5	2.5	2.1	-0.3
08:18	20.01	0.44	1.8	2.5	2.1	-0.2

AVERAGE VALUES FOR THE LAST 30 MINUTES

08:18	20.03	0.45	5.4	2.4	2.1	-0.2
08:19	20.02	0.45	1.9	2.5	2.1	-0.1
08:20	20.02	0.45	2.0	2.4	2.1	-0.2
08:21	20.04	0.44	1.2	2.5	2.1	-0.2
08:22	20.02	0.44	1.9	2.4	2.1	-0.3
08:23	20.00	0.45	1.6	2.4	2.1	-0.2
08:24	20.00	0.45	1.2	2.5	2.1	-0.2
08:25	20.00	0.44	1.5	2.5	2.1	-0.2
08:26	20.00	0.44	1.7	2.5	2.1	-0.1
08:27	20.00	0.44	1.4	2.5	2.1	-0.2
08:28	20.00	0.44	1.0	2.5	2.1	-0.1
08:29	20.00	0.44	1.1	2.5	2.1	-0.2
08:30	20.00	0.44	2.0	2.5	2.1	-0.3
08:31	20.00	0.43	1.4	2.5	2.1	0.0
08:32	20.00	0.43	1.6	2.5	2.1	-0.1
08:33	20.00	0.43	1.4	2.5	2.0	-0.3
08:34	20.00	0.43	1.5	2.5	2.1	-0.2
08:35	20.00	0.43	1.4	2.5	2.1	-0.2
08:36	20.00	0.43	1.1	2.5	2.1	-0.1
08:37	19.99	0.43	1.8	2.6	2.1	-0.2
08:38	19.99	0.43	1.5	2.6	2.1	-0.2
08:39	20.00	0.43	1.5	2.5	2.0	-0.1

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TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
08:40	19.99	0.43	1.5	2.6	2.1	-0.3
08:41	19.99	0.43	1.4	2.7	2.2	-0.2
08:42	19.99	0.44	5.0	2.8	2.2	-0.2
08:43	19.99	0.44	50.1	2.6	2.0	-0.4
08:44	19.99	0.45	123.8	2.4	1.8	-0.2
08:45	19.99	0.47	181.7	2.2	1.6	-0.1
08:46	19.98	0.48	272.9	2.0	1.4	-0.2
08:47	19.98	0.49	351.9	1.7	1.1	-0.2
08:48	19.99	0.49	386.2	1.6	1.1	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
08:48	20.00	0.44	46.9	2.4	2.0	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
08:48	20.01	0.45	26.1	2.4	2.0	-0.2
08:49	19.95	0.51	451.0	1.5	1.0	-0.1
08:50	19.90	0.52	622.7	1.4	0.9	-0.3
08:51	19.90	0.52	716.0	1.4	0.9	-0.3
08:52	19.93	0.53	734.8	1.4	0.9	-0.0
08:53	19.92	0.53	755.5	1.3	0.9	-0.2
08:54	19.92	0.53	766.3	1.3	0.9	-0.2
08:55	19.95	0.53	769.8	1.3	0.9	-0.2
08:56	19.95	0.53	777.9	1.3	0.9	-0.2
08:57	19.87	0.55	852.3	1.3	0.9	-0.2
08:58	19.86	0.55	963.9	1.4	1.0	-0.1
08:59	19.85	0.56	999.2	1.4	1.1	-0.2
09:00	19.84	0.56	939.7	1.5	1.1	-0.2
09:01	19.84	0.59	893.0	1.5	1.1	-0.2
09:02	19.75	0.70	1301.8	1.3	0.9	-0.2
09:03	19.73	0.77	1647.5	1.2	0.9	-0.2
09:04	19.83	0.78	1641.1	1.2	0.9	-0.1
09:05	19.84	0.78	1517.2	1.2	0.9	-0.1
09:06	19.84	0.79	1465.4	1.2	0.9	-0.4
09:07	19.84	0.79	1462.8	1.2	0.9	-0.2
09:08	19.84	0.80	1453.9	1.2	0.9	-0.3
09:09	19.84	0.81	1448.4	1.2	0.9	-0.2
09:10	19.85	0.82	1428.7	1.2	0.9	-0.2
09:11	19.85	0.81	1395.2	1.3	0.9	-0.2
09:12	19.84	0.81	1390.5	1.3	0.9	-0.3
09:13	19.85	0.82	1412.5	1.3	0.9	-0.2
09:14	19.85	0.83	1438.5	1.2	0.8	-0.2
09:15	19.85	0.83	1505.3	1.1	0.7	-0.2
09:16	19.96	0.75	1369.6	1.1	0.7	-0.2
09:17	20.08	0.75	765.6	1.6	1.4	-0.2
09:18	20.13	0.76	370.0	2.8	2.8	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
09:18	19.88	0.68	1108.5	1.3	1.0	-0.2
09:19	20.13	0.76	206.3	4.0	3.8	-0.3
09:20	20.14	0.74	125.5	4.6	4.4	-0.3
09:21	20.15	0.71	75.2	4.8	4.4	-0.2
09:22	20.14	0.70	63.7	4.8	4.3	-0.2

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
09:23	20.14	0.72	176.4	3.7	3.1	-0.2
09:24	20.15	0.73	193.1	3.9	4.0	-0.2
09:25	20.15	0.75	72.1	5.6	5.5	-0.3
09:26	20.14	0.74	31.8	6.1	5.8	-0.2
09:27	20.15	0.75	14.8	6.2	5.9	-0.3
09:28	20.15	0.76	6.8	6.4	6.0	-0.2
09:29	20.15	0.76	2.6	6.4	6.0	-0.2
09:30	20.15	0.73	1.2	6.4	5.9	-0.4
09:31	20.22	0.64	1.6	5.6	5.4	-0.2
09:32	20.15	0.73	7.7	6.4	6.2	-0.1
09:33	20.11	0.80	48.4	6.1	5.4	-0.2
09:34	19.99	0.82	369.1	3.7	2.8	-0.2
09:35	19.97	0.79	891.2	2.0	1.4	-0.1
09:36	19.95	0.79	1157.6	1.7	1.1	-0.2
09:37	19.94	0.80	1275.0	1.6	1.0	-0.1
09:38	20.00	0.74	1263.1	1.5	1.0	-0.2
09:39	20.00	0.73	1026.8	1.5	1.0	-0.3
09:40	19.99	0.78	1295.3	1.4	0.9	-0.1
09:41	19.92	0.82	1441.4	1.3	0.9	-0.3
09:42	19.84	0.84	1618.7	1.3	0.9	-0.3
09:43	19.84	0.84	1753.9	1.3	0.9	-0.2
09:44	19.84	0.84	1749.7	1.3	0.8	-0.2
09:45	19.91	0.81	1621.1	1.4	1.0	-0.1
09:46	19.98	0.79	1498.2	1.6	1.2	-0.4
09:47	19.99	0.78	1501.7	1.9	1.6	-0.2
09:48	19.99	0.78	1624.5	2.3	2.1	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
09:48	20.05	0.76	703.8	3.6	3.2	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
09:48	19.96	0.72	906.2	2.5	2.1	-0.2
09:49	19.99	0.79	1670.5	2.6	2.3	-0.0
09:50	19.98	0.79	1343.9	2.4	2.0	-0.2
09:51	19.96	0.79	1266.7	2.1	1.7	-0.2
09:52	19.97	0.78	1267.6	1.8	1.4	-0.1
09:53	19.99	0.76	1236.8	1.6	1.2	-0.0
09:54	19.99	0.76	1218.9	1.5	1.1	-0.2
09:55	19.98	0.77	1245.1	1.4	1.1	-0.1
09:56	19.96	0.78	1279.4	1.3	1.0	-0.2
09:57	19.91	0.78	1300.7	1.3	0.9	-0.2
09:58	19.86	0.79	1318.5	1.3	0.9	-0.2
09:59	19.87	0.79	1319.0	1.2	0.9	-0.2
10:00	19.86	0.79	1318.6	1.2	0.9	-0.2
10:01	19.87	0.79	1307.1	1.2	0.9	-0.2
10:02	19.86	0.79	1299.3	1.2	0.9	-0.2
10:03	19.87	0.78	1278.1	1.2	0.9	-0.1
10:04	19.86	0.77	1262.1	1.1	0.9	-0.3
10:05	19.85	0.77	1250.7	1.1	0.7	-0.2
10:06	19.84	0.78	1268.0	1.1	0.7	-0.2
10:07	19.84	0.77	1294.0	1.1	0.7	-0.3
10:08	19.84	0.77	1308.2	1.1	0.7	-0.2
10:09	19.84	0.78	1331.1	1.1	0.7	-0.1

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
10:10	19.84	0.78	1320.2	1.2	0.7	-0.2
10:11	19.84	0.78	1323.6	1.1	0.7	-0.1
10:12	19.84	0.77	1350.3	1.1	0.7	-0.1
10:13	19.84	0.77	1380.4	1.1	0.7	-0.1
10:14	19.84	0.77	1384.3	1.0	0.6	-0.1
10:15	19.84	0.77	1407.4	1.0	0.7	-0.2
10:16	19.83	0.77	1485.6	1.2	0.8	-0.2
10:17	19.82	0.77	1567.2	1.4	1.1	-0.2
10:18	19.79	0.77	1565.6	1.9	1.6	-0.2
AVERAGE VALUES FOR THE LAST 30 MINUTES						
10:18	19.88	0.78	1339.0	1.4	1.0	-0.2
10:19	19.71	0.79	1564.3	2.4	2.2	-0.2
10:20	19.70	0.79	1593.7	2.9	2.7	-0.3
10:21	19.68	0.81	1628.6	3.4	3.1	-0.2
10:22	19.60	0.84	2000.7	3.7	3.4	-0.1
10:23	19.57	0.85	2184.5	3.7	3.4	-0.4
10:24	19.56	0.86	2163.4	3.5	3.0	-0.2
10:25	19.54	0.87	2130.2	3.1	2.6	-0.3
10:26	19.54	0.87	2110.2	2.8	2.3	-0.2
10:27	19.54	0.86	2109.2	2.5	2.1	-0.2
10:28	19.54	0.86	2106.5	2.3	1.9	-0.1
10:29	19.51	0.87	2238.5	2.2	1.8	-0.2
10:30	19.45	0.87	2429.5	2.3	1.9	-0.4
10:31	19.40	0.90	2659.0	2.5	2.2	-0.2
10:32	19.39	0.91	2880.1	2.9	2.6	-0.3
10:33	19.39	0.93	2905.4	3.4	3.1	-0.2
10:34	19.23	1.03	3569.2	4.1	3.9	-0.2
10:35	19.26	0.98	3196.8	4.6	4.3	-0.4
10:36	19.29	0.98	3044.0	4.6	4.2	-0.1
10:37	19.36	0.94	2916.3	4.7	4.4	-0.2
10:38	19.33	0.95	2895.8	4.7	4.4	-0.3
10:39	19.29	0.97	3009.2	4.6	4.4	-0.3
10:40	19.26	0.99	2949.5	4.7	4.5	-0.2
10:41	19.22	1.05	3269.9	4.9	4.8	-0.4
10:42	19.07	1.16	3675.1	5.2	5.0	-0.1
10:43	18.93	1.22	4144.7	5.3	5.3	-0.2
10:44	18.90	1.24	4054.4	4.8	4.5	-0.2
10:45	19.46	0.85	3072.0	4.6	4.4	-0.2
10:46	19.53	0.77	2229.0	4.3	4.1	-0.1
10:47	19.33	0.93	2794.8	4.4	4.3	-0.2
10:48	19.26	0.95	3519.3	4.7	4.7	-0.0
AVERAGE VALUES FOR THE LAST 30 MINUTES						
10:48	19.39	0.93	2701.5	3.8	3.5	-0.2
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
10:48	19.64	0.85	2020.2	2.6	2.2	-0.2

COMMENTS: POST TEST SYSTEM BIAS AT THE STACK
(CONTINUED ON THE NEXT PAGE)

- problem w/ post test system bias because sample line to the sample pump has a cut close to the 3/8" nut. Replace with a nylon nut and restart system bias check. Hung D.

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK

DATE : 03-09-1995 TIME: 10:48 - 11:15

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.16
13	STACK	% O2	11.07	10.99
14	STACK	% CO2	0.00	0.05
14	STACK	% CO2	9.13	9.02
12	STACK	ppmCO	0.0	1.8
12	STACK	ppmCO	5010.0	5001.6
10	STACK	ppmNOx	0.0	0.4
10	STACK	ppmNOx	46.7	44.8
11	STACK	ppmNO	0.0	0.1
11	STACK	ppmNO	46.7	44.7
9	STACK	ppmSO2	0.0	-0.2
9	STACK	ppmSO2	499.1	465.8

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK FOR THC ANALYZER

DATE : 03-09-1995 TIME: 11:18 - 11:26

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
7	STACK	ppnC1	0.0	8.5
7	STACK	ppnC1	3000.0	3064.7
7	STACK	ppnC1	5020.0	5047.0
7	STACK	ppnC1	8009.0	7995.8

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2	CHAN 7 STACK ppmCl
11:32	19.40	1.06	240.5	4.4	4.2	0.1	13.0
11:33	19.39	1.06	239.2	4.4	4.2	-0.3	13.0
11:34	19.40	1.06	244.1	4.4	4.2	-0.3	13.0
11:35	19.39	1.07	319.5	4.0	3.9	-0.5	12.4
11:36	19.39	1.07	381.4	3.8	3.8	-0.3	11.5
11:37	19.39	1.08	330.8	4.0	4.0	-0.1	12.6
11:38	19.39	1.08	237.0	4.3	4.3	-0.2	13.1
11:39	19.39	1.07	196.3	4.3	4.2	-0.3	12.7
11:40	19.40	1.06	159.5	4.3	4.4	-0.2	11.9
11:41	19.40	1.06	139.4	4.3	4.3	-0.2	11.9
11:42	19.41	1.06	176.1	4.2	4.2	-0.2	11.0
11:43	19.39	1.07	209.4	4.1	4.1	-0.2	12.1
11:44	19.39	1.12	380.6	3.7	3.6	-0.2	11.8
11:45	19.39	1.17	540.0	3.2	3.2	-0.2	11.3
11:46	19.39	1.21	561.7	3.3	3.4	-0.3	11.9

COMMENTS: CHANGE RANGE OF THE THC ANALYZER
TO A LOWER RANGE OF 0-100

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: US BUREAU OF MINES - ALBANY OREGON

DATE: 03-09-1995 TIME: 11:47

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
13	STACK	% O2	25	0.10 V	0%
14	STACK	% CO2	20	1.00 V	0%
12	STACK	ppmCO	10000	10.00 V	0%
10	STACK	ppmNOx	250	10.00 V	0%
11	STACK	ppmNO	200	10.00 V	0%
9	STACK	ppmSO2	5000	10.00 V	0%
7	STACK	ppmCl	100	10.00 V	0%

AVERAGING PERIODS: 30 MINUTES, ONE HOUR,
NO EMISSION RATE CALCULATIONS

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM CALIBRATION FOR THC ANALYZER AT LOWER RANGE

DATE : 03-09-1995 TIME: 11:52 - 11:58

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
7	STACK	ppnC1	0.0	0.7
7	STACK	ppnC1	25.4	22.6
7	STACK	ppnC1	51.0	51.3

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2	CHAN 7 STACK ppmCl
12:02	19.40	1.24	47.7	5.1	5.1	-0.2	2.7
12:03	19.39	1.24	45.6	5.0	5.0	-0.2	2.6
12:04	19.39	1.24	31.7	4.9	5.0	-0.2	2.6
12:05	19.39	1.24	50.9	4.8	4.9	-0.4	2.6
12:06	19.39	1.24	32.1	4.8	5.0	-0.3	2.6
12:07	19.39	1.24	20.8	4.9	5.0	-0.1	2.6
12:08	19.39	1.24	24.5	4.9	5.0	-0.2	2.5
12:09	19.39	1.24	17.3	4.9	5.0	-0.2	2.5
12:10	19.39	1.23	14.1	4.8	5.0	-0.3	2.4
12:11	19.39	1.24	21.8	4.8	5.0	-0.3	2.5
12:12	19.39	1.24	25.6	4.8	5.0	-0.3	2.4
12:13	19.38	1.24	14.4	4.9	5.0	-0.4	2.4
12:14	19.38	1.24	10.8	4.8	5.0	-0.2	2.3
12:15	19.39	1.25	10.3	4.9	5.1	-0.3	2.3
12:16	19.38	1.25	10.9	4.9	5.0	-0.1	2.4
12:17	19.39	1.25	17.5	4.9	5.0	-0.2	2.4
12:18	19.38	1.26	14.4	4.9	5.2	-0.4	2.4
12:19	19.39	1.26	10.7	5.0	5.2	-0.2	2.4
12:20	19.39	1.26	10.5	5.0	5.2	-0.4	2.3
12:21	19.39	1.26	10.5	5.0	5.2	-0.2	2.6
12:22	19.40	1.26	5.9	5.1	5.2	-0.3	2.3
12:23	19.39	1.27	9.7	5.0	5.2	-0.2	2.4
12:24	19.40	1.27	10.6	5.1	5.2	-0.2	2.4
12:25	19.41	1.27	9.2	5.1	5.3	-0.3	2.4
12:26	19.40	1.27	4.1	5.2	5.4	-0.2	2.4
12:27	19.41	1.27	7.3	5.2	5.4	-0.1	2.4
12:28	19.43	1.26	0.5	5.3	5.4	-0.2	2.4
12:29	19.43	1.27	0.9	5.3	5.4	-0.1	2.5
12:30	19.45	1.27	1.9	5.3	5.3	-0.4	2.5
12:31	19.44	1.27	0.4	5.3	5.3	-0.2	2.5
AVERAGE VALUES FOR THE LAST 30 MINUTES							
12:31	19.40	1.25	16.4	5.0	5.1	-0.2	2.5
12:32	19.43	1.28	4.6	5.3	5.4	-0.4	2.5
12:33	19.44	1.27	10.4	5.3	5.3	-0.3	2.5
12:34	19.42	1.27	0.7	5.4	5.4	-0.2	2.6
12:35	19.44	1.26	1.1	5.5	5.4	-0.4	2.6
12:36	19.40	1.26	0.3	5.5	5.4	-0.2	2.6
12:37	19.42	1.26	0.7	5.4	5.4	-0.2	2.6
12:38	19.39	1.27	2.2	5.4	5.3	-0.3	2.6
12:39	19.39	1.27	10.8	5.3	5.2	-0.6	2.6
12:40	19.39	1.27	10.6	5.3	5.2	-0.3	2.6
12:41	19.38	1.27	10.7	5.3	5.3	-0.2	2.6
12:42	19.38	1.28	0.6	5.5	5.4	-0.3	2.6
12:43	19.38	1.28	4.2	5.6	5.4	-0.2	2.6
12:44	19.38	1.28	10.7	5.6	5.4	-0.2	2.5
12:45	19.37	1.29	10.3	5.6	5.4	-0.2	2.5
12:46	19.37	1.30	0.7	5.7	5.6	-0.4	2.5
12:47	19.37	1.30	0.4	5.7	5.6	-0.3	2.5
12:48	19.38	1.30	7.1	5.7	5.6	-0.4	2.6
12:49	19.38	1.31	2.3	5.7	5.6	-0.2	2.5
12:50	19.37	1.31	0.5	5.8	5.7	-0.4	2.5
12:51	19.38	1.31	0.7	6.0	5.8	-0.5	2.5
12:52	19.38	1.29	0.2	5.8	5.6	-0.4	2.5

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2	CHAN 7 STACK ppmCl
12:53	19.38	1.30	0.6	5.7	5.5	-0.3	2.5
12:54	19.38	1.31	10.7	5.6	5.4	-0.2	2.5
12:55	19.38	1.31	7.7	5.7	5.6	-0.3	2.5
12:56	19.38	1.30	0.4	5.7	5.6	-0.2	2.4
12:57	19.38	1.27	0.3	5.8	5.8	-0.3	2.3
12:58	19.39	1.27	0.7	5.9	5.8	-0.2	2.2
12:59	19.39	1.27	0.5	6.0	5.9	-0.1	2.2
13:00	19.39	1.26	0.3	5.9	5.8	-0.2	2.2
13:01	19.39	1.26	0.4	5.9	5.8	-0.4	2.1
AVERAGE VALUES FOR THE LAST 30 MINUTES							
13:01	19.39	1.28	3.7	5.6	5.5	-0.3	2.5
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA							
13:01	19.39	1.27	10.1	5.3	5.3	-0.3	2.5
13:02	19.40	1.26	0.5	5.9	5.8	-0.1	2.1
13:03	19.38	1.27	0.8	5.9	5.8	-0.2	2.1
13:04	19.38	1.27	0.6	5.9	5.9	-0.2	2.7
13:05	19.40	1.26	0.8	5.8	5.8	-0.2	3.2
13:06	19.39	1.27	0.5	5.8	5.8	-0.3	2.3
13:07	19.39	1.28	0.6	5.8	5.8	-0.2	2.3
13:08	19.38	1.29	0.5	5.7	5.8	-0.1	2.2
13:09	19.38	1.29	0.5	5.7	5.7	-0.1	2.2
13:10	19.39	1.29	0.4	5.6	5.6	-0.2	2.2
13:11	19.39	1.28	0.5	5.6	5.6	-0.3	2.1
13:12	19.42	1.27	0.2	5.6	5.6	-0.2	2.1
13:13	19.44	1.28	0.7	5.6	5.6	-0.2	2.1
13:14	19.47	1.29	0.2	5.6	5.5	-0.2	2.1
13:15	19.50	1.28	0.5	5.3	5.3	-0.3	2.1
13:16	19.53	1.27	0.3	5.2	5.2	-0.2	2.1
13:17	19.53	1.28	0.8	5.2	5.3	-0.1	2.1
13:18	19.54	1.28	0.5	5.3	5.3	-0.2	2.1
13:19	19.54	1.29	0.4	5.4	5.4	-0.2	2.1
13:20	19.54	1.29	1.0	5.4	5.4	-0.2	2.5
13:21	19.54	1.29	0.1	5.5	5.5	-0.2	2.2
13:22	19.55	1.28	0.4	5.4	5.4	-0.4	2.1
13:23	19.55	1.28	1.2	5.5	5.5	-0.4	2.1
13:24	19.55	1.28	0.4	5.5	5.5	-0.1	2.1
13:25	19.55	1.28	0.3	5.6	5.5	-0.1	2.1
13:26	19.56	1.27	0.4	5.5	5.4	-0.2	2.1
13:27	19.55	1.26	0.8	5.5	5.4	-0.2	2.1
13:28	19.54	1.27	0.3	5.5	5.4	-0.3	2.1
13:29	19.53	1.28	0.2	5.5	5.4	-0.3	2.1
13:30	19.54	1.27	0.1	5.5	5.4	-0.2	2.1
13:31	19.53	1.26	0.3	5.4	5.4	-0.4	2.1
AVERAGE VALUES FOR THE LAST 30 MINUTES							
13:31	19.48	1.28	0.5	5.6	5.5	-0.2	2.2
13:32	19.53	1.27	0.5	5.5	5.5	-0.2	2.1
13:33	19.53	1.27	0.5	5.5	5.5	-0.2	2.2
13:34	19.52	1.27	0.3	5.5	5.4	-0.3	2.1
13:35	19.51	1.27	0.9	5.4	5.4	-0.3	2.1

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2	CHAN 7 STACK ppmCl
13:36	19.51	1.26	0.3	5.3	5.3	-0.4	2.1
13:37	19.52	1.26	0.6	5.3	5.3	-0.3	2.4
13:38	19.49	1.27	0.2	5.2	5.3	-0.3	2.2
13:39	19.47	1.27	0.8	5.2	5.3	-0.3	2.1
13:40	19.46	1.27	0.2	5.2	5.3	-0.4	2.9
13:41	19.45	1.28	0.3	5.2	5.3	-0.3	2.5
13:42	19.46	1.28	0.8	5.3	6.3	-0.2	2.2
13:43	19.45	1.27	0.9	5.4	6.7	-0.4	2.1
13:44	19.45	1.27	0.3	5.4	5.6	-0.3	2.1
13:45	19.45	1.27	1.0	5.5	5.6	-0.2	2.1
13:46	19.44	1.28	0.3	5.5	5.6	-0.5	2.1
13:47	19.40	1.28	0.6	5.5	5.6	-0.2	2.1
13:48	19.41	1.28	0.4	5.5	5.7	-0.3	2.1
13:49	19.40	1.28	0.8	5.6	5.8	-0.4	2.2
13:50	19.41	1.28	0.3	5.6	5.8	-0.2	2.1
13:51	19.42	1.28	0.3	5.6	5.8	-0.2	2.1
13:52	19.43	1.29	0.7	5.7	5.9	-0.2	2.0
13:53	19.43	1.29	0.3	5.8	6.0	-0.2	2.1
13:54	19.42	1.29	0.2	5.9	6.1	-0.2	2.1
13:55	19.44	1.28	0.7	5.9	6.1	-0.3	2.1
13:56	19.41	1.28	0.8	5.8	6.1	-0.2	2.0
13:57	19.41	1.29	0.4	5.8	6.0	-0.3	2.0
13:58	19.41	1.30	1.1	5.8	6.0	-0.1	2.0
13:59	19.40	1.29	1.0	5.7	6.0	-0.2	2.0
14:00	19.45	1.27	0.2	5.8	6.1	-0.3	2.0
14:01	19.47	1.27	0.8	5.9	6.1	-0.7	2.0

AVERAGE VALUES FOR THE LAST 30 MINUTES

14:01	19.45	1.28	0.6	5.6	5.7	-0.3	2.1

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

14:01	19.47	1.28	0.5	5.6	5.6	-0.3	2.2

14:02	19.47	1.28	0.2	5.7	6.0	-0.2	2.0
14:03	19.49	1.29	0.7	5.7	6.0	-0.3	1.9
14:04	19.46	1.30	0.0	5.7	6.0	-0.3	2.0
14:05	19.49	1.29	0.2	5.7	6.0	-0.2	1.9
14:06	19.50	1.29	0.2	5.8	6.2	-0.4	1.9
14:07	19.49	1.30	0.5	6.0	6.3	-0.4	1.9
14:08	19.49	1.29	0.2	6.1	6.4	-0.4	1.9
14:09	19.51	1.28	1.1	6.2	6.6	-0.2	2.0
14:10	19.52	1.28	0.7	6.2	6.6	-0.4	2.0
14:11	19.51	1.30	1.0	6.3	6.7	-0.2	1.9
14:12	19.50	1.32	0.2	6.6	7.0	-0.3	1.9
14:13	19.51	1.31	0.3	6.9	7.4	-0.4	1.9
14:14	19.54	1.30	0.7	7.2	7.6	-0.2	2.4
14:15	19.53	1.30	1.0	7.1	7.5	-0.5	2.1
14:16	19.54	1.29	0.7	6.9	7.2	-0.2	2.0
14:17	19.54	1.30	0.0	6.6	7.0	-0.5	2.0
14:18	19.54	1.30	0.7	6.3	6.7	-0.4	1.9
14:19	19.54	1.29	0.7	6.2	6.6	-0.3	2.0
14:20	19.54	1.30	1.5	6.1	6.6	-0.1	1.8
14:21	19.55	1.31	0.4	6.1	6.6	-0.4	2.2
14:22	19.54	1.31	0.4	6.0	6.3	-0.2	1.9

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2	CHAN 7 STACK ppmCl
14:23	19.55	1.31	0.1	5.9	6.3	-0.3	1.9
14:24	19.55	1.31	0.6	5.9	6.3	-0.2	1.9
14:25	19.55	1.32	1.1	5.9	6.3	-0.4	1.9
14:26	19.54	1.33	1.4	5.8	6.2	-0.3	1.9
14:27	19.53	1.34	1.1	5.9	6.3	-0.3	1.9
14:28	19.54	1.35	0.7	6.0	6.4	-0.3	1.9

COMMENTS: END TEST AT THE STACK

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK

DATE : 03-09-1995 TIME: 14:28 - 14:39

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.18
13	STACK	% O2	11.07	10.99
14	STACK	% CO2	0.00	0.04
14	STACK	% CO2	9.13	9.09
12	STACK	ppmCO	0.0	0.5
12	STACK	ppmCO	5010.0	5055.6
10	STACK	ppmNOx	0.0	-0.0
10	STACK	ppmNOx	46.7	47.0
11	STACK	ppmNO	0.0	0.1
11	STACK	ppmNO	46.7	47.3
9	STACK	ppmSO2	0.0	-0.2
9	STACK	ppmSO2	499.1	459.0
7	STACK	ppnC1	0.0	1.0
7	STACK	ppnC1	25.4	23.4

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: US BUREAU OF MINES - ALBANY OREGON

DATE: 03-09-1995 TIME: 14:42

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
13	IN-FUR	% O2	25	0.10 V	0%
14	IN-FUR	% CO2	20	1.00 V	0%
12	IN-FUR	ppmCO	10000	10.00 V	0%
10	IN-FUR	ppmNOx	250	10.00 V	0%
11	IN-FUR	ppmNO	200	10.00 V	0%
9	IN-FUR	ppmSO2	5000	10.00 V	0%
7	IN-FUR	ppmCl	100	10.00 V	0%

AVERAGING PERIODS: 30 MINUTES, ONE HOUR,
NO EMISSION RATE CALCULATIONS

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 IN-FUR % O2	CHAN14 IN-FUR % CO2	CHAN12 IN-FUR ppmCO	CHAN10 IN-FUR ppmNOx	CHAN11 IN-FUR ppmNO	CHAN 9 IN-FUR ppmSO2	CHAN 7 IN-FUR ppmCl
14:59	10.45	18.59	3337.8	1.5	2.0	-0.4	-4.9
15:00	11.04	18.00	9982.3	1.0	2.3	-0.4	-2.5
15:01	11.16	18.17	9982.6	0.9	2.8	-0.2	-0.0
15:02	10.88	18.73	9982.1	1.0	3.7	-0.4	9.6
15:03	10.84	18.78	9982.2	1.1	4.7	-0.2	8.5
15:04	10.71	18.68	9982.2	1.3	6.2	-0.3	8.2
15:05	11.26	17.31	9981.9	1.5	6.7	-0.3	8.0
15:06	11.32	16.73	9949.5	1.6	7.6	-0.3	8.1
15:07	11.62	15.83	8657.1	1.8	7.9	-0.2	8.8
15:08	11.35	15.97	7837.9	1.8	8.8	-0.4	10.3
15:09	10.62	17.28	7544.5	1.9	11.0	-0.3	12.1
15:10	10.15	18.21	7802.0	1.9	13.4	-0.2	12.2
15:11	9.74	19.02	7898.9	1.8	16.1	-0.1	18.8
15:12	9.62	19.21	8289.8	15.1	17.9	-0.4	24.4
15:13	9.56	19.01	8027.1	2.3	18.9	-0.2	15.1
15:14	9.72	18.36	7729.8	2.3	19.0	-0.4	10.7
15:15	9.92	16.87	7015.6	2.3	17.5	-0.2	9.7
15:16	9.71	16.62	6041.6	2.3	17.8	-0.2	9.5
15:17	9.59	16.61	5744.6	2.3	18.1	-0.3	8.9
15:18	9.46	16.72	5535.9	2.3	18.5	-0.1	8.2
15:19	9.55	16.69	5508.8	2.2	18.8	-0.3	8.1
15:20	9.93	15.90	5255.8	2.2	17.5	-0.2	7.6
15:21	9.90	16.13	5017.2	2.2	17.6	-0.4	7.3
15:22	9.90	16.19	5068.9	2.1	18.3	-0.2	6.9
15:23	9.90	15.06	5207.5	2.1	18.3	-0.2	6.8
15:24	9.46	12.78	4196.2	2.1	16.3	-0.3	7.2
15:25	9.23	11.78	3563.5	2.1	15.3	-0.3	7.2
15:26	9.02	11.55	3308.3	2.0	15.1	-0.4	6.9
15:27	8.80	11.49	3277.6	2.0	15.2	-0.1	6.6
15:28	8.67	11.42	3218.6	1.9	15.2	-0.4	6.5

AVERAGE VALUES FOR THE LAST 30 MINUTES

15:28	10.10	16.46	6830.9	2.3	12.9	-0.3	8.5
15:29	8.40	11.50	3187.7	1.9	15.4	-0.2	6.3
15:30	8.24	11.44	3147.7	1.9	15.8	-0.4	6.1
15:31	8.24	11.25	3023.4	1.9	15.6	-0.4	5.9
15:32	8.26	11.03	2902.2	1.9	15.5	-0.2	5.8
15:33	8.25	10.88	2789.7	1.9	15.5	-0.2	5.7
15:34	8.02	10.97	2696.5	1.9	15.7	-0.2	5.6
15:35	7.78	11.12	2686.3	2.0	16.1	1.4	5.4
15:36	7.73	11.02	2608.2	2.0	16.2	4.8	5.0
15:37	7.64	10.90	2490.4	2.1	16.3	7.3	4.9
15:38	7.63	10.79	2375.7	2.2	16.2	7.7	4.9
15:39	7.57	10.64	2265.4	2.3	16.3	11.4	4.9
15:40	7.48	10.46	2143.0	2.4	16.6	16.7	5.1
15:41	7.30	10.44	2036.8	2.6	16.8	21.2	5.2
15:42	7.17	10.42	1948.5	3.0	17.4	36.5	5.2
15:43	6.93	10.44	1843.2	3.9	19.0	60.6	5.1
15:44	6.64	10.44	1734.1	4.9	20.4	82.0	4.8
15:45	6.50	10.40	1630.5	5.5	21.5	92.1	4.7
15:46	6.47	10.32	1519.9	6.2	22.5	93.4	4.7
15:47	6.43	10.21	1415.7	8.1	24.6	94.7	4.6
15:48	6.90	9.72	1303.5	9.8	24.5	90.4	4.6
15:49	6.88	9.63	1191.3	11.2	25.7	92.3	4.6

(Note: This page was not included in the original report from the vendor.)

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: POST TEST SYSTEM BIAS CHECK

DATE : 03-09-1995 TIME: 16:22 - 17:00

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	IN-FUR	% O2	0.00	0.15
13	IN-FUR	% O2	11.07	11.16
14	IN-FUR	% CO2	0.00	0.03
14	IN-FUR	% CO2	9.13	9.25
12	IN-FUR	ppmCO	0.0	2.3
12	IN-FUR	ppmCO	5010.0	5037.1
10	IN-FUR	ppmNOx	0.0	-0.2
10	IN-FUR	ppmNOx	46.7	48.7
11	IN-FUR	ppmNO	0.0	0.3
11	IN-FUR	ppmNO	46.7	45.1
9	IN-FUR	ppmSO2	0.0	0.0
9	IN-FUR	ppmSO2	499.1	476.2
7	IN-FUR	ppnC1	0.0	2.3
7	IN-FUR	ppnC1	25.4	25.8

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 IN-FUR % O2	CHAN14 IN-FUR % CO2	CHAN12 IN-FUR ppmCO	CHAN10 IN-FUR ppmNOx	CHAN11 IN-FUR ppmNO	CHAN 9 IN-FUR ppmSO2	CHAN 7 IN-FUR ppmCl
17:58	3.82	3.52	10.7	1.9	4.5	0.8	4.3
17:59	4.59	2.90	3.5	-0.0	3.7	0.0	4.5
18:00	4.17	2.88	10.7	-0.1	3.1	0.0	4.4
18:01	2.00	12.63	3.8	-0.0	6.5	0.0	7.7
18:02	2.92	20.32%	462.2	0.0	15.3	0.0	12.0
18:03	3.69	23.30%	1067.1	0.1	26.6	1.7	17.7
18:04	4.06	24.94%	4.6	0.1	43.1	1.4	14.0
18:05	5.20	24.16%	5.1	0.2	55.2	2.4	5.7
18:06	9.31	17.43%	15.5	0.2	55.3	2.5	2.0

COMMENTS: END TEST
PLUGING OF THE CONDENSER SYSTEM

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 IN-FUR % O2	CHAN14 IN-FUR % CO2	CHAN12 IN-FUR ppmCO	CHAN10 IN-FUR ppmNOx	CHAN11 IN-FUR ppmNO	CHAN 9 IN-FUR ppmSO2	CHAN 7 IN-FUR ppmCl
18:47	1.02	25.01%	10.6	7.9	173.5	3.5	-1.0
18:48	1.64	25.01%	5.9	6.8	197.6	2.4	-0.9
18:49	2.49	25.01%	11.2	4.3	198.1	2.6	-0.9
18:50	4.63	25.01%	7.2	3.2	198.1	4.0	-0.9
18:51	5.95	25.01%	7.2	2.7	198.1	4.7	-0.9

COMMENTS: END TEST
DUE TO PLUGING

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 INLET % O2	CHAN14 INLET % CO2	CHAN12 INLET ppmCO	CHAN10 INLET ppmNOx	CHAN11 INLET ppmNO	CHAN 9 INLET ppmSO2	CHAN 7 INLET ppmCl

COMMENTS: PLUGING SYSTEM WHILE SAMPLING AT
THE FURNACE INLET

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 IN-FUR % O2	CHAN14 IN-FUR % CO2	CHAN12 IN-FUR ppmCO	CHAN10 IN-FUR ppmNOx	CHAN11 IN-FUR ppmNO	CHAN 9 IN-FUR ppmSO2	CHAN 7 IN-FUR ppmCl
20:35	20.36	1.11	3257.4	3.1	5.3	0.0	-0.6
20:36	20.21	1.33	2076.2	3.5	4.7	0.1	-0.7
20:37	20.48	0.82	2398.0	2.8	3.9	0.1	-0.6

COMMENTS: LOST SIGNIFICANT FLOW
THC ANALYZER PUMP DIE DUE TO WATER IN THE
PUMP - LOST POWER TO THE HEATED SAMPLE
LINE

US BUREAU OF MINES - ALBANY OREGON 03-09-1995

TIME	CHAN13 IN-FUR % O2	CHAN14 IN-FUR % CO2	CHAN12 IN-FUR ppmCO	CHAN10 IN-FUR ppmNOx	CHAN11 IN-FUR ppmNO	CHAN 9 IN-FUR ppmSO2	CHAN 7 IN-FUR ppmCl
23:14	12.72	14.91	3926.5	2.6	23.7	0.0	-0.1
23:15	16.59	9.70	37.3	3.1	26.2	0.0	-0.1
23:16	20.19	2.01	2503.6	0.9	15.0	0.0	-0.1
23:17	20.54	0.80	1243.1	0.8	10.7	0.0	-0.1
23:18	20.85	0.28	50.6	0.0	7.7	0.0	-0.1
23:19	20.89	0.21	15.4	-0.1	5.7	0.0	-0.1
23:20	20.90	0.18	13.5	-0.1	4.4	-0.0	-0.1
23:21	20.91	0.16	12.4	-0.1	3.5	0.0	-0.1
23:22	20.84	0.32	91.7	0.1	3.1	0.0	-0.1
23:23	20.79	0.22	50.1	-0.1	2.4	0.0	-0.1
23:24	20.90	0.13	9.4	-0.3	1.8	0.0	-0.1
23:25	20.90	0.14	3.7	-0.4	1.5	0.0	-0.1
23:26	20.91	0.13	6.6	-0.3	1.4	0.0	-0.1
23:27	20.91	0.12	2.6	-0.3	1.3	0.0	-0.1
23:28	20.91	0.12	2.7	-0.4	1.2	0.0	-0.1
23:29	20.91	0.12	2.5	-0.4	1.1	0.0	-0.1
23:30	20.91	0.12	2.8	-0.4	1.1	0.0	-0.1
23:31	20.91	0.12	2.9	-0.4	1.0	0.0	-0.1
23:32	20.91	0.12	2.2	-0.4	0.9	-0.0	-0.1
23:33	20.91	0.12	2.0	-0.4	0.9	0.0	-0.1
23:34	20.91	0.12	2.8	-0.4	0.9	0.0	-0.1
23:35	20.92	0.12	2.4	-0.4	0.9	-0.0	-0.1
23:36	20.91	0.12	2.6	-0.4	0.9	0.0	-0.1
23:37	20.91	0.12	2.8	-0.4	0.9	0.0	-0.1
23:38	20.91	0.12	2.7	-0.4	0.9	0.0	-0.1
23:39	20.91	0.11	2.8	-0.5	0.8	0.0	-0.1
23:40	20.84	0.68	3.5	-0.5	0.8	0.0	-0.1
23:41	17.94	4.93	3391.3	-0.1	3.7	0.0	-0.1
23:42	20.90	0.26	608.0	-0.4	2.7	0.0	-0.1
23:43	20.91	0.16	13.7	-0.5	2.2	0.0	-0.1
AVERAGE VALUES FOR THE LAST 30 MINUTES							
23:43	20.35	1.23	400.5	-0.0	4.3	0.0	-0.1
23:44	20.91	0.13	2.9	-0.5	1.9	0.0	-0.1
23:45	20.91	0.12	2.4	-0.5	1.7	0.0	-0.1
23:46	20.91	0.12	2.2	-0.5	1.5	-0.0	-0.1
23:47	20.91	0.11	2.2	-0.5	1.3	0.0	-0.1
23:48	20.91	0.11	2.0	-0.5	1.2	0.0	-0.1
23:49	20.91	0.11	2.5	-0.5	1.1	0.0	-0.1
23:50	20.91	0.11	2.8	-0.6	1.1	0.0	-0.1
23:51	20.91	0.11	2.2	-0.6	1.0	0.0	-0.1
23:52	20.91	0.11	2.2	-0.6	0.9	0.0	-0.1
23:53	20.91	0.11	2.4	-0.6	0.9	0.0	-0.1
23:54	20.91	0.11	2.3	-0.6	0.9	0.0	-0.1
23:55	20.91	0.11	2.3	-0.6	0.9	0.0	-0.1
23:56	20.91	0.11	2.0	-0.6	0.9	0.0	-0.1
23:57	20.91	0.11	2.4	-0.6	0.9	0.0	-0.1
23:58	20.91	0.11	2.3	-0.6	0.9	-0.0	-0.1
23:59	20.91	0.11	2.8	-0.6	0.9	-0.0	-0.1
24:00	20.91	0.11	2.8	-0.6	0.9	0.1	-0.1

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: PRETEST SYSTEM BIAS CHECK AT THE STACK

DATE : 03-10-1995 TIME: 00:13 - 00:24

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.16
13	STACK	% O2	11.07	11.13
14	STACK	% CO2	0.00	0.06
14	STACK	% CO2	9.13	9.23
12	STACK	ppmCO	0.0	2.4
12	STACK	ppmCO	5010.0	4951.3
10	STACK	ppmNOx	0.0	-0.7
10	STACK	ppmNOx	46.7	46.5
11	STACK	ppmNO	0.0	0.3
11	STACK	ppmNO	46.7	42.8
9	STACK	ppmSO2	0.0	0.0
9	STACK	ppmSO2	499.1	462.6

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: US BUREAU OF MINES - ALBANY OREGON

DATE: 03-10-1995 TIME: 00:25

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
13	STACK	% O2	25	0.10 V	0%
14	STACK	% CO2	20	1.00 V	0%
12	STACK	ppmCO	10000	10.00 V	0%
10	STACK	ppmNOx	250	10.00 V	0%
11	STACK	ppmNO	200	10.00 V	0%
9	STACK	ppmSO2	5000	10.00 V	0%

AVERAGING PERIODS: 30 MINUTES, ONE HOUR,
NO EMISSION RATE CALCULATIONS

US BUREAU OF MINES - ALBANY OREGON 03-10-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
00:29	20.03	0.82	2.3	15.3	13.2	7.4
00:30	20.01	0.83	2.6	8.6	7.6	5.6
00:31	20.00	0.85	2.4	5.0	5.1	4.2
00:32	19.99	0.88	2.8	3.7	4.0	2.6
00:33	19.98	0.90	2.6	2.6	3.2	2.5
00:34	19.99	0.92	2.7	2.3	3.1	2.4
00:35	19.98	0.97	2.6	2.8	3.4	2.4
00:36	19.99	0.98	2.4	2.7	3.3	2.4
00:37	19.98	1.03	2.7	2.6	3.2	2.4
00:38	19.92	1.09	2.8	2.9	3.7	2.4
00:39	19.86	1.15	2.4	3.6	4.3	2.4
00:40	19.84	1.23	2.8	4.4	5.1	0.9
00:41	19.84	1.26	2.8	5.3	5.8	-0.0
00:42	19.84	1.28	2.4	5.8	6.2	0.0
00:43	19.85	1.28	2.0	5.9	6.1	0.0
00:44	19.86	1.27	2.4	5.5	5.9	0.0
00:45	19.83	1.39	2.2	6.2	6.6	0.0
00:46	19.84	1.41	2.1	6.6	6.8	0.0
00:47	19.85	1.38	2.8	6.7	7.1	0.1
00:48	19.84	1.40	1.8	7.5	7.8	0.0
00:49	19.85	1.40	2.6	7.4	7.4	0.0
00:50	19.87	1.37	2.6	6.8	7.1	0.0
00:51	19.84	1.41	2.1	6.8	6.8	0.0
00:52	19.84	1.37	2.4	5.7	5.8	0.0
00:53	19.85	1.32	2.1	4.7	5.0	0.0
00:54	19.88	1.22	2.4	3.8	4.2	0.0
00:55	19.91	1.11	2.5	3.5	4.0	0.1
00:56	19.95	1.02	2.7	3.6	4.2	0.0
00:57	19.97	0.97	2.8	3.7	4.2	0.0
00:58	19.98	0.95	2.4	3.9	4.4	0.0
AVERAGE VALUES FOR THE LAST 30 MINUTES						
00:58	19.91	1.15	2.5	5.2	5.5	1.3
00:59	19.99	0.94	2.6	3.9	4.3	0.1
01:00	19.99	0.93	2.8	3.5	4.0	0.1
01:01	20.00	0.93	2.4	3.3	3.8	-0.0
01:02	19.99	0.92	2.1	3.0	3.6	0.0
01:03	20.00	0.92	2.3	2.7	3.3	0.0
01:04	19.99	0.93	2.5	2.5	3.1	0.0
01:05	20.00	0.94	2.8	2.3	3.0	0.0
01:06	19.99	0.94	2.7	2.2	2.8	0.0
01:07	19.99	0.94	2.1	2.2	2.8	0.0
01:08	19.99	0.93	2.4	2.2	2.8	0.0
01:09	19.99	0.92	2.5	2.2	2.8	0.0
01:10	20.00	0.91	2.5	2.1	2.8	-0.0
01:11	20.00	0.91	2.7	2.0	2.6	0.0
01:12	19.99	0.94	2.6	1.9	2.6	0.0
01:13	19.97	0.95	2.8	2.1	2.8	0.0
01:14	20.22	0.77	2.6	2.2	2.8	0.0
01:15	20.31	0.69	2.5	1.9	2.5	0.0
01:16	20.37	0.68	2.4	1.8	2.4	0.0
01:17	20.35	0.69	2.0	1.8	2.4	0.0
01:18	20.34	0.69	2.5	1.8	2.5	0.0
01:19	20.35	0.69	2.6	1.9	2.6	0.1

US BUREAU OF MINES - ALBANY OREGON 03-10-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
01:20	20.32	0.72	2.5	2.0	2.7	0.0
01:21	20.24	0.82	2.2	2.4	3.0	0.0
01:22	20.22	0.83	3.1	2.4	3.0	0.0
01:23	20.19	0.83	2.8	2.4	3.0	0.0
01:24	20.15	0.84	2.6	2.5	3.2	-0.0
01:25	20.15	0.82	2.6	2.6	3.2	0.1
01:26	20.16	0.83	2.8	2.6	3.2	0.0
01:27	20.14	0.85	2.0	2.6	3.2	0.0
01:28	20.11	0.86	2.0	2.6	3.2	-0.0
AVERAGE VALUES FOR THE LAST 30 MINUTES						
01:28	20.12	0.85	2.5	2.4	3.0	0.0
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA						
01:28	20.01	1.00	2.5	3.8	4.3	0.6
01:29	20.05	0.88	2.4	2.7	3.2	0.1
01:30	20.03	0.89	2.5	2.7	3.2	0.0
01:31	20.01	0.89	2.4	2.6	3.2	0.0

COMMENTS: END TEST RUN AT STACK LOCATION

US BUREAU OF MINES - ALBANY OREGON 03-10-1995

TIME	CHAN13 STACK % O2	CHAN14 STACK % CO2	CHAN12 STACK ppmCO	CHAN10 STACK ppmNOx	CHAN11 STACK ppmNO	CHAN 9 STACK ppmSO2
01:36	20.00	0.90	2.8	2.7	3.2	0.0
01:37	19.99	0.90	2.9	2.8	3.3	0.0
01:38	20.00	0.90	3.0	2.8	3.4	0.0
01:39	19.99	0.90	2.5	2.9	3.4	0.1
01:40	20.00	0.90	2.7	3.0	3.4	0.0
01:41	19.99	0.92	2.4	3.0	3.5	0.1
01:42	19.99	0.92	2.4	3.0	3.6	0.0
01:43	19.99	0.92	2.8	3.2	3.7	0.0
01:44	19.98	0.93	2.4	3.5	4.1	0.0
01:45	19.96	0.94	2.8	3.8	4.3	0.0
01:46	19.89	0.96	2.4	4.2	4.7	-0.0
01:47	19.86	0.98	2.9	4.9	5.3	0.0
01:48	19.86	0.99	2.5	5.0	5.3	0.1
01:49	19.85	0.99	2.6	5.0	5.3	0.0
01:50	19.85	0.99	2.7	5.1	5.5	0.0
01:51	19.85	1.00	2.8	5.4	5.7	0.0
01:52	19.84	0.99	2.6	5.7	5.9	0.0
01:53	19.85	1.00	2.3	5.8	6.0	-0.0
01:54	19.85	1.00	2.5	5.9	6.2	0.0
01:55	19.84	1.00	2.8	6.3	6.6	0.0
01:56	19.85	1.00	2.8	6.6	6.8	0.0
01:57	19.86	1.00	2.5	6.8	7.0	0.0
01:58	19.86	1.00	2.2	6.9	7.1	0.0
01:59	19.85	1.00	2.4	7.0	7.2	0.1
02:00	19.85	1.01	2.4	7.3	7.5	0.0
02:01	19.89	0.98	2.5	7.9	7.9	0.0
02:02	19.98	0.92	2.7	6.3	5.9	0.0
02:03	19.99	0.91	2.6	4.2	4.4	0.0
02:04	19.99	0.92	2.0	3.8	4.1	-0.0

COMMENTS: POST TEST SYSTEM BIAS CHECK
AT THE STACK LOCATION

CALIBRATION SUMMARY

SOURCE: US BUREAU OF MINES - ALBANY OREGON

REASON: SYSTEM BIAS CHECK AT THE STACK

DATE : 03-10-1995 TIME: 02:04 - 02:14

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
13	STACK	% O2	0.00	0.16
13	STACK	% O2	11.07	11.14
14	STACK	% CO2	0.00	0.08
14	STACK	% CO2	9.13	9.30
12	STACK	ppmCO	0.0	2.6
12	STACK	ppmCO	5010.0	5059.8
10	STACK	ppmNOx	0.0	-0.6
10	STACK	ppmNOx	46.7	49.1
11	STACK	ppmNO	0.0	0.3
11	STACK	ppmNO	46.7	44.9
9	STACK	ppmSO2	0.0	0.1
9	STACK	ppmSO2	499.1	473.8

Appendix D
Analytical Data
Particulate, Metals, NH_3, HCl, Cl_2, HF, and F_2

BEST AVAILABLE COPY

MOISTURE ANALYTICAL RESULTS

WHC-SD-WM-VI-032
Revision 0

Plant Name: US Bureau of Mines

Job No. 13911

City/State: Albany, Oregon

Sampling Loc.: Furnace Outlet

Run Number	-1	-2	-3
Sampling Date	3/8/95	3/9/95	3/9/95
Analysis Date	3/8/95	3/9/95	3/9/95
Analyst	SCG	SCG	SCG
Reagent 1 (0.1N H_2SO_4)	ABORT		
Final Weight, g	576.5	663.5	577.2
Tared Weight, g	575.9	577.3	578.2
Water Catch, g	-29.4	86.2	-1.0
Reagent 2 (0.1N NaOH)			
Final Weight, g	419.2	344.3	429.9
Tared Weight, g	421.7	431.9	431.1
Water Catch, g	-2.5	-87.6	-1.2
Reagent 3 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g	*-31.9	-1.0	-2.2
Silica Gel			
Final Weight, g	202.3	201.6	203.5
Tared Weight, g	200.0	200.0	200.0
ADSORBED WATER, g	2.3	1.6	3.5
TOTAL WATER COLLECTED, g	* NA	0.6	1.3

Balance No. 2 Type (✓) Triple Beam ✓ Electronic ___ Reagent Box No. M145

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments

D 2

L-0036 rev. 7-92

FATROPY

WHC-SD-WM-VI-032
Revision 0

FIELD SAMPLE RECOVERY [illegible]

Box No. M145 Assembly Date 3/3/95 Assembled By GM

Client LOCKHEED Job No. 13911

Plant US Bureau of Mines City/State Albany, Oregon

Sampling Loc. Furnace Outlet 1 Method

Individual Tare Of Reagent 200 (Ml) (gm) Of 0.1N H_2SO_4

Individual Tare Of Reagent 200 (Ml) (gm) Of 0.1N NaOH

Individual Tare Of Reagent (Ml) (gm) Of

Individual Tare Of Sil. Gel 200 Gm

other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
1	3/8	Q118	0.4097	✓	SCG	3/8	0	✓	SCG
Furnace outlet ABORT		Q119	0.4178						
2	3/9	Q156	0.4223	✓	SCG		0	✓	SCG
3	3/9	Q148	0.4092	✓	SCG	3/9	0	✓	SCG

Filter Appearance*: ① Heavy brown coating ② Train backflush ≈15ml, Dark black

Reagents Appearance*: clear see ② above

Filter Appearance*: Brown of filter; much in rinse

Reagents Appearance*: Clear

Filter Appearance*: Grey on filter; much in rinse

Reagents Appearance*: clear

Filter Appearance*:

Reagents Appearance*:

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ✓ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS

D 3

[illegible] rev. 5-93

RECORD OF CUSTODY, CONTAINER No. M145

WHC-SD-WM-VI-032
Revision 0

Client LOCKHEED Job No. 13911

Plant Name US Bureau of Mines

City/State Albany, Oregon

Sampling Method(s) _____ (EPA, NIOSH, etc.)

Container Type (V) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
0000498	3/3/95	1529	S	[illegible]	
	3/7/95	1035	B	[illegible]	To change trains
0000857	3/9/95	1830	S	[illegible]	
	3/13/95	927	B	[illegible]	Log-in
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian			Seal Intact?**
[illegible] Signature	3/13/95 Date	927 Time	Yes ✓ No __ NA __

As Applicable:

All liquid levels at mark (✓) YES ✓ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:

TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

B 4

L-0023 rev. 8-93

MOISTURE ANALYTICAL RESULTS

WHC-SD-WM-VI-032
Revision 0

Plant Name: US Bureau of Mines
Job No. 13911

City/State: Albany, Oregon
Sampling Loc.: Furnace Outlet

Run Number	4	5	6
Sampling Date	3/9/95	3/9/95	3/9/95
Analysis Date	3/9/95	3/9/95	3/9/95
Analyst	SCC	SCC	SCC
Reagent 1 (0.1N H_2SO_4)			
Final Weight, g	589.6	579.5	584.8
Tared Weight, g	581.8	575.5	573.6
Water Catch, g	7.8	4.0	11.2
Reagent 2 (0.1N NaOH)			
Final Weight, g	425.0	433.6	429.5
Tared Weight, g	424.5	430.6	431.1
Water Catch, g	0.5	3.0	-1.6
Reagent 3 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g	7.3	7.0	9.6
Silica Gel			
Final Weight, g	204.5	204.1	204.5
Tared Weight, g	200.0	200.0	200.0
ADSORBED WATER, g	4.5	4.1	4.5
TOTAL WATER COLLECTED, g	12.8	11.1	14.1

Balance No. 7 Type (✓) Triple Beam ✓ Electronic ___ Reagent Box No. M130

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments

L-0036 rev. 7-92

FARROW

Box No. 14130 Assembly Date 3/3/95 Assembled By GM

Client LOCKHEED Job No. 13911

Plant US Bureau of Mines City/State Albany, Oregon

Sampling Loc. Furnace Outlet Method

Individual Tare Of Reagent 200 (ml) (gm) Of 0.1N H_2SO_4

Individual Tare Of Reagent 200 (ml) (gm) Of 0.1N NaOH

Individual Tare Of Reagent _____ (ml) (gm) Of _____

Individual Tare Of Sil. Gel 200 Gm _____ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
4	3/9/95	Q147	0.4112	✓	SCG	3/9	0	✓	SCG
				Filter Appearance* clean					
				Reagents Appearance* clean					
5	3/9/95	Q 149	0.4170	✓	SCG	3/9	10%	✓	SCG
				Filter Appearance* orange Heavy loading loose particulate					
				Reagents Appearance* cloudy silgel - Black					
6		Q105	0.4157	✓	SCG	3/9	10%	✓	SCG
				Filter Appearance*					
				Reagents Appearance* orange silgel - colored Red					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ✓ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS Run 4 - small amt. acetone ≈ 5ml rinsed in 200ml 0.1N NaOH after run

D 6

RECORD OF CUSTODY, CONTAINER No. M130

WHC-SD-WM-VI-032
Revision 0

Client LOCHEED Job No. 13911

Plant Name US Bureau of Mines

City/State Albany, Oregon

Sampling Method(s) _____ (EPA, NIOSH, etc.)

Container Type (√) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
0000447	3/3/95	1428	S	Gary Mate	
	3/8/95	2230	B	[illegible]	To change Trans
0000351	3/10/95	1250	S	[illegible]	
	3/13/95	0930	B	Gary Mate	Log-in
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian			Seal Intact?**
Gary Mate	3/13/95	0930	Yes ✓ No __ NA __
Signature	Date	Time	

As Applicable:
All liquid levels at mark (√) YES ✓ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

D 7

L-0023 rev. 8-93

MOISTURE ANALYTICAL RESULTS

WHC-SD-WM-VI-032
Revision 0
Job No. 13911

Plant Name ISBM

City/State Albany, OR Sampling Loc. INLET

Run Number	CEM-I-1	CEM-I-2	CEM-I-3
Sampling Date	3/9/95	3/9/95	3/9/95
Analysis Date	3/9/95	3/9/95	3/9/95
Analyst	SCG	SCG	SCG
Reagent 1 (0.1N H_2SO_4)			
Final Weight, g	591.3		
Tared Weight, g	576.2		
Water Catch, g	15.1		
Reagent 2 (0.1N NaOH)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			
Silica Gel			
Final Weight, g			
Tared Weight, g	200.0 g	200.0 g	200.0 g
ADSORBED WATER, g			
TOTAL WATER COLLECTED, g			

Balance No. _____ Type (✓) Triple Beam ___ Electronic ___ Reagent Box No. M150

Balance located in stable, draft-free area (✓)? Yes ___ No ___ (If "No", explain below.)

Comments _____

L-0036 rev. 7-92

FIELD SAMPLE RECEIVER [illegible]

WHC-SD-WM-VI-032
Revision 0

Box No. M150 Assembly Date 3/3/95 Assembled By GM

Client LOCKHEED Job No. 13911

Plant USBM City/State ALBANY, OR

Sampling Loc. INLET Method

Individual Tare Of Reagent 200 (Ml) (gm) Of 0.1N H_2SO_4

Individual Tare Of Reagent 200 (Ml) (gm) Of 0.1N NaOH

Individual Tare Of Reagent _____ (Ml) (gm) Of _____

Individual Tare Of Sil. Gel 200 Gm _____ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
CEM-I-1	3/9/95	—	—	—	SCG	3/9/95	—	—	SCG
				Filter Appearance*					
				Reagents Appearance* Clear					
CEM-I-2	3/9/95	—	—	—	SCG	3/9/95	—	—	SCG
				Filter Appearance*					
				Reagents Appearance* Blank					
CEM-I-3	3/9/95	—	—	✓	SCG	3/9/95	—	—	SCG
				Filter Appearance*					
				Reagents Appearance* Brown					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ✓ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS

[illegible] rev. 5-93

RECORD OF CUSTODY, CONTAINER No. M150

WHC-SD-WM-VI-032
Revision 0

Client LOCKHEED Job No. 13901

Plant Name USBM

City/State Albany, OR

Sampling Method(s) _____ (EPA, NIOSH, etc.)

Container Type (✓) Reagent Box ✓ Cooler __ Other (specify) _____

Seal No. or "PC"	Date	Time	*	Full Signature	Reason for Breaking Seal**
0000537	3/3/95	1430	S	[signature]	
			B		
0000040	3/10/95	1340	S	[signature]	
	3/13/95	0931	B	[signature]	Log-in
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

PC = Personal Custody * S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Container Received by Entropy Sample Custodian			Seal Intact?**
[signature] Signature	3/13/95 Date	0931 Time	Yes ✓ No __ NA __

As Applicable:
All liquid levels at mark (✓) YES ✓ NO __ (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by _____ Date _____ Time _____

CONDENSATE SAMPLES put in refrige. by _____ Date _____ Time _____

REMARKS _____

D 10

L-0023 rev. 8-93

ANALYTICAL NARRATIVE

WHC-SD-WM-VI-032
Revision 0

RFA No. N/A

Plant Name U.S. BUREAU OF MINES

Analyst GARY MATA

Date Rec'd in Lab 3/13/95

Lab Proj. Mgr. N/A

Analysis Date 3/14-17/95

Analysis Method & Analytes EPA METHOD 5

Sample Matrix & Components FRONT HALF RINSE (ACETONE) & TARED GLASS MAT FILTER

Summary of Sample Prep (added rinse in lab, final volumed, pH adjusted, etc.)

FRONT HALF RINSES WERE EVAPORATED IN THE LABORATORY HOOD, THEN DESICCATED.

Summary of Instrumentation ANALYTICAL BALANCE (METTLER AT 200)

Minimum Detectable Limit 0.1mg

Summary of QA/QC Sample Analysis ACETONE BLANK WAS < 1.0mg

Spikes (describe spikes and % recovery) N/A

Specific Comments Regarding Sample Analysis (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify run number(s) when applicable.)

THE SAMPLE WEIGHINGS FOR RUN No. 6 SEEMED TO DECREASE QUITE A BIT AFTER EVERY WEIGHING. THE FRONT HALF RINSE AFTER EACH WEIGHING WOULD DECREASE QUITE DRAMATICALLY. HOWEVER, IF THE SAMPLE SETS OUT IN THE AMBIENT FOR A SHORT DURATION OF TIME, THE SAMPLE WOULD GAIN A NOTICEABLE AMOUNT WEIGHT.

USE PAGE 2 IF ADDITIONAL SPACE NEEDED FOR ANY ITEM

Confirmation of Data Review

Lab Project Manager Signature Gary Mata Date 3/17/95

Lab QA Officer Signature _____ Date _____

L-0039 (Page 1) 3-92

ENTROPY

PARTICULATE SAMPLING LABORATORY RESULTS (Version 02.14.92)

Plant Name: U.S. Bureau of Mines — EEI Ref # 13911

Sampling Location: Furnace Outlet

Date Received: March 13, 1995

Run Number			2			3			4
Sample ID/Container #	init.	date	F / 214		date	F / 215		date	F / 216
	GM	03/14/95	@ 4.8613		03/14/95	4.9604		03/14/95	@ 4.2305
	GM	03/14/95	4.8618		03/14/95	@ 4.9602		03/14/95	4.2306
Baggie Tare Wt., g.			3.9738			3.9838			3.7983
Filter Tare Wt., g.		# Q156	0.4223		# Q148	0.4092		# Q147	0.4112
FILTER SAMPLE WT., g.			0.4652			0.5672			0.0210

Sample ID/Container #	init.	date	R / 209		date	R / 210		date	R / 211
	GM	03/14/95	@ 7.5203		03/14/95	8.8111		03/14/95	3.9413
	GM	03/14/95	7.5262		03/14/95	@ 8.8089		03/14/95	@ 3.9412
Tare Wt., g.		(300 ml)	3.8901		(250 ml)	3.9322		(50 ml)	3.9376
RINSE SAMPLE WT., g.			3.6302			4.8767			0.0036

Filter Catch, mg.	465.2	567.2	21.0
Rinse Catch, mg.	3630.2	4876.7	3.6
Rinse Blank Residue, mg.	1.1	0.9	0.2
Net Rinse Catch, mg.	3629.2	4875.8	3.4
FILTERABLE PARTICULATE, mg.	4094.3	5443.0	24.4

Blank Beaker #	B / 153	
Final wt., mg.	3.9565	
Tare wt., mg.	3.9558	
Residue, mg.	0.7	
Volume, ml.	200	
Density, mg/ml	785.0	
Conc., mg/mg	4.459E-06	<--
Upper Limit, mg/mg	1.000E-05	

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
2	2	3
3	2	3
4	1	1

Notes and comments:
Predominate color of samples is: Greenish-gray
Date of full balance span March 13, 1995

Printing Date 17-Mar-95 Printing Time 10:37 AM

PARTICULATE SAMPLING LABORATORY RESULTS (Version 02.14.92)

Plant Name: U.S. Bureau of Mines — EEI Ref # 13911

Sampling Location: Furnace Outlet

Date Received: March 13, 1995

Run Number	5	6

Sample ID/Container #			F / 217			F / 149			F /
	init.	date			date			date	
	GM				03/16/95	@	5.6525		
	SCG				03/15/95		5.6530		
	GM				03/15/95		5.6714		
	GM	03/14/95		9.1260	03/14/95		5.6994		
	GM	03/14/95	@	9.1183	03/14/95		5.7470		0.0000
Baggie Tare Wt., g.				3.8482			3.7924		0.0000
Filter Tare Wt., g.				0.4170			0.4157		0.0000
FILTER SAMPLE WT., g.				4.8531			1.4444		0.0000

Sample ID/Container #			R / 212			R / 213			R /
	init.	date			date			date	
	GM				03/17/95		13.1370		
	GM				03/17/95		13.2428		
	SCG				03/16/95		13.4868		
	GM				03/16/95		13.6505		
	GM	03/14/95		8.0962	03/15/95		13.9050		
	GM	03/14/95	@	8.0926	03/15/95		14.1031		0.0000
Tare Wt., g.		(325 ml)		3.8587	(350 ml)		3.9183	(ml)	0.0000
RINSE SAMPLE WT., g.				4.2339			9.2187		0.0000

Filter Catch, mg.	4853.1	1444.4	0.0
Rinse Catch, mg.	4233.9	9218.7	0.0
Rinse Blank Residue, mg.	1.1	1.2	0.0
Net Rinse Catch, mg.	4232.8	9217.5	0.0
FILTERABLE PARTICULATE, mg.	9085.9	10661.9	0.0

Blank Beaker #	B / 153	
Final wt., mg.	3.9565	
Tare wt., mg.	3.9558	
Residue, mg.	0.7	
Volume, ml.	200	
Density, mg/ml	785.0	
Conc., mg/mg	4.459E-06	<-
Upper Limit, mg/mg	1.000E-05	

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
5	2	3
6	1	3

Notes and comments:
Predominate color of samples is: 5 - Light brown; 6 - Greenish-gray
Date of full balance span March 13, 1995

Printing Date 21-Mar-95 Printing Time 10:23 AM

REAGENT BLANK(S) LABORATORY RESULTS (Version 02.14.92)

Plant Name:	U.S. Bureau of Mines	EEI Ref #	13911
Sampling Location:	N/A		
Date Received:	March 13, 1995		

Run Number				Acetone
Sample ID/Container #				B / 153
	Init.	date		
	GM	03/14/95		3.9568
	GM	03/14/95	@	3.9565
Tare Wt., g.		(200	ml)	3.9558
SAMPLE WT., g.				0.0007

Notes and comments:

Predominate color of samples is: N/A

Date of full balance span March 13, 1995

Printing Date 17-Mar-95 Printing Time 10:37 AM

Quanterra
Environmental Services

Quanterra Incorporated
880 Riverside Parkway
West Sacramento, California 95605

916 373-5600 Telephone
916 372-1059 Fax

April 21, 1995

QUANTERRA PROJECT NUMBER: 080968
PO/CONTRACT: 10847

Shawn Graham
Entropy, Inc.
5932 Bolsa Avenue
Suite 105
Huntington Beach, CA 92649

Dear Mr. Graham:

This report contains the analytical results for the six airtrain samples which were received under chain of custody by Quanterra Environmental Services on 21 March 1995. This sample set is associated with your Lockheed project.

The case narrative is an integral part of this report.

Preliminary results were sent via facsimile on 18, 19 and 20 April 1995.

If you have any questions, please call me at (916) 374-4333.

Sincerely,

Robert Weidenfeld
Project Manager

RW/jas

Enclosures

Quanterra
Environmental Services

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Includes Samples: 1 - 5
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- Laboratory Control Sample Report (DCS)

Quanterra
Environmental Services

CASE NARRATIVE

QUANTERRA PROJECT NUMBER 080968

There were no anomalies were associated with this report.

Quanterra
Environmental Services

QUANTERRA'S QUALITY ASSURANCE PROGRAM

Quanterra has implemented an extensive Quality Assurance (QA) program to ensure the production of scientifically sound, legally defensible data of known documentable quality. A key element of this program is Quanterra's Laboratory Control Sample (LCS) system. Controlling lab operations with LCS (as opposed to matrix spike/matrix spike duplicate samples), allows the lab to differentiate between bias as a result of procedural errors versus bias due to matrix effects. The analyst can then identify and implement the appropriate corrective actions at the bench level, without waiting for extensive senior level review or costly and time-consuming sample re-analyses. The LCS program also provides our client with information to assess batch, and overall laboratory performance.

Laboratory Control Samples - (LCS)

Laboratory Control Samples (LCS) are well-characterized, laboratory generated samples used to monitor the laboratory's day-to-day performance of routine analytical methods. The results of the LCS are compared to well-defined laboratory acceptance criteria to determine whether the laboratory system is "in control". Three types of LCS are routinely analyzed: Duplicate Control Samples (DCS), Single Control Samples (SCS), and method blanks. Each of these LCS are described below.

Duplicate Control Samples. A DCS is a well-characterized matrix (blank water, sand, sodium sulfate or celite) which is spiked with certain target parameters and analyzed at approximately 10% of the sample load in order to establish method-specific control limits.

Single Control Samples. An SCS consists of a control matrix that is spiked with surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g. metals or conventional analyses) a single control sample identical to the DCS serves as the control sample. An SCS is prepared for each sample lot. Accuracy is calculated identically to the DCS.

Method Blank Results. A method blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your samples.

Quanterra
Environmental Services

SAMPLE DESCRIPTION INFORMATION
for
Entropy, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
080968-0001-SA	2	AIRTRAIN	21 MAR 95		21 MAR 95
080968-0001-DU	2-Nitric Probe Rinse	AQUEOUS	21 MAR 95		21 MAR 95
080968-0002-SA	3	AIRTRAIN	21 MAR 95		21 MAR 95
080968-0002-DU	3-Nitric Probe Rinse	AQUEOUS	21 MAR 95		21 MAR 95
080968-0003-SA	4	AIRTRAIN	21 MAR 95		21 MAR 95
080968-0003-DU	4-Nitric Probe Rinse	AQUEOUS	21 MAR 95		21 MAR 95
080968-0004-SA	5	AIRTRAIN	21 MAR 95		21 MAR 95
080968-0004-DU	5-Nitric Probe Rinse	AQUEOUS	21 MAR 95		21 MAR 95
080968-0005-SA	6	AIRTRAIN	21 MAR 95		21 MAR 95
080968-0005-DU	6-Nitric Probe rinse	AQUEOUS	21 MAR 95		21 MAR 95
080968-0006-SA	CEM-Inlet-1	AIRTRAIN	28 MAR 95		28 MAR 95

ENTROPY, INC.

Specialists in Air Emissions Technology

REQUEST FOR ANALYSIS

PURCHASE ORDER # 10847 JOB NAME: Lockheed

LABORATORY: Quanterra Environmental Services JOB No.: 13911

DATE SAMPLES WERE TRANSMITTED: March 20, 1995 EXPECTED DATE OF RESULTS: April 10, 1995

SAMPLE MATRIX: 0.1N H2SO4, 0.1N NaOH, Filter and evaporated acetone front half rinse

TYPE OF ANALYSIS REQUESTED: Please analyze Front Half Rinses (acetone and 0.1N HNO3) and filter for multiple metals (Al, B, Ca, Cl, Co, F, Fe, K, Mo, Na, P and S). Analyze the 1st & 2nd impingers for ammonia, HCl and HF. Analyze the 3rd & 4th impingers for Cl2 and F2. Please be careful when handling samples. High H2S concentratons is expected. Please consult with Robert Weidenfeld before analyzing for Cl and F on front half rinses and filter.

Sample / Run ID#	Components	Matrix	Condition of Samples*
2	1st & 2nd Impingers	0.1N H2SO4	
	3rd & 4th Impingers	0.1N NaOH	
	FH Rinse (acetone)	Acetone	
	FH Rinse (0.1N HNO3)	0.1N HNO3	
	Filter	Quartz Filter	
3	1st & 2nd Impingers	0.1N H2SO4	
	3rd & 4th Impingers	0.1N NaOH	
	FH Rinse (acetone)	Acetone	
	FH Rinse (0.1N HNO3)	0.1N HNO3	
	Filter	Quartz Filter	
4	1st & 2nd Impingers	0.1N H2SO4	
	3rd & 4th Impingers	0.1N NaOH	
	FH Rinse (acetone)	Acetone	
	FH Rinse (0.1N HNO3)	0.1N HNO3	
	Filter	Quartz Filter	

* For Laboratory Comments(temp., labels, etc.)

Samples Relinquished by: [signature] Date/Time 1135 3/20/95

Transported by: Fed Ex Date/Time 3/20/95

Transported to: Quanterra Environmental Services
880 Riverside Parkway
West Sacramento, CA 95605-1501
(916)374-4333

Received by: [signature] Date/Time 3/21/95 / 0900

5932 Bolsa Avenue, Suite 105 • Huntington Beach, CA 92649 • Phone (800) 899-3687 • Fax (714) 895-1915

ENTROPY, INC.

Specialists in Air Emissions Technology

REQUEST FOR ANALYSIS

PURCHASE ORDER # 10847 JOB NAME: Lockheed

LABORATORY: Quanterra Environmental Services JOB No.: 13911

DATE SAMPLES WERE TRANSMITTED: March 20, 1995 EXPECTED DATE OF RESULTS: April 10, 1995

SAMPLE MATRIX: 0.1N H2SO4, 0.1N NaOH, Filter and evaporated acetone front half rinse

TYPE OF ANALYSIS REQUESTED: Please analyze Front Half Rinses (acetone and 0.1N HNO3) and filter for multiple metals (Al, B, Ca, Cl, Co, F, Fe, K, Mo, Na, P and S). Analyze the 1st & 2nd impingers for ammonia, HCl and HF. Analyze the 3rd & 4th impingers for Cl2 and F2. Please be careful when handling samples. High H2S concentratons is expected. Please consult with Robert Weidenfeld before analyzing for Cl and F on the front half rinses and filter.

Sample / Run ID#	Components	Matrix	Condition of Samples*
5	1st & 2nd Impingers	0.1N H2SO4	
	3rd & 4th Impingers	0.1N NaOH	
	FH Rinse (acetone)	Acetone	
	FH Rinse (0.1N HNO3)	0.1N HNO3	
	Filter	Quartz Filter	
6	1st & 2nd Impingers	0.1N H2SO4	
	3rd & 4th Impingers	0.1N NaOH	
	FH Rinse (acetone)	Acetone	Not Rec'd Per Client to be Rec'd 3/22/95
	FH Rinse (0.1N HNO3)	0.1N HNO3	
	Filter	Quartz Filter	

* For Laboratory Comments(temp., labels, etc.)

Samples Relinquished by: [signature] Date/Time 1135 3/20/95

Transported by: Fed Ex Date/Time 3/20/95

Transported to: Quanterra Environmental Services
880 Riverside Parkway
West Sacramento, CA 95605-1501
(916)374-4333

Received by: [signature] Date/Time 3/21/95 0900

D 21

5932 Bolsa Avenue, Suite 105 • Huntington Beach, CA 92649 • Phone (800) 899-3687 • Fax (714) 895-1915

ENTROPY, INC.

Specialists in Air Emissions Technology

REQUEST FOR ANALYSIS

PURCHASE ORDER # 10847 JOB NAME: Lockheed

LABORATORY: Quanterra Environmental Services JOB No.: 13911

DATE SAMPLES WERE TRANSMITTED: March 27, 1995 EXPECTED DATE OF RESULTS: April 10, 1995

SAMPLE MATRIX: 0.1N H2SO4

TYPE OF ANALYSIS REQUESTED: Please the sample for ammonia.

Sample / Run ID#	Components	Matrix	Condition of Samples*
CEM - Inlet - 1	1st & 2nd Impingers	0.1N H2SO4	
		Recd in good condition on 3/28/95	

* For Laboratory Comments(temp., labels, etc.)

Samples Relinquished by: Harry P. Mate Date/Time 3/27/95 10:00

Transported by: FED. EXPRESS Date/Time 3/27/95

Transported to: Quanterra Environmental Services
880 Riverside Parkway
West Sacramento, CA 95605-1501
(916)374-4338

Received by: [signature] Date/Time 3/28/95 1215

D 22

5932 Bolsa Avenue, Suite 105 • Huntington Beach, CA 92649 • Phone (800) 899-3687 • Fax (714) 895-1915

Selected Metals - Various Methods

Quanterra Environmental Services

METALS

(Water - Total)

Client Name: Entropy, Inc.
Client ID: 2
Lab ID: 080968-0001-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method		Prepared Date	Analyzed Date	
Aluminum	6.3	mg/sampl	0.20	6010		04 APR 95	12 APR 95	
Boron	346	mg/sampl	0.20	6010		04 APR 95	12 APR 95	
Calcium	4.1	mg/sampl	1.0	6010		04 APR 95	12 APR 95	
Cesium	31.8	mg/sampl	0.20	6020	(Modified)	04 APR 95	10 APR 95	R
Iron	1.7	mg/sampl	0.20	6010		04 APR 95	12 APR 95	
Molybdenum	17.6	mg/sampl	0.040	6010		04 APR 95	12 APR 95	
Phosphorus	8.3	mg/sampl	0.60	6010		04 APR 95	12 APR 95	
Potassium	178	mg/sampl	10.0	6010		04 APR 95	12 APR 95	
Sodium	957	mg/sampl	20.0	6010		04 APR 95	12 APR 95	R
Strontium	0.095	mg/sampl	0.0020	6020	(Modified)	04 APR 95	10 APR 95	R
Sulfur	95.4	mg/sampl	0.10	6010		04 APR 95	12 APR 95	

Note R : Raised reporting limit(s) due to high analyte level(s).

ND = Not detected
NA = Not applicable

Reported By: John Disney

Approved By: Darlene Flores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

METALS

(Water - Total)

Client Name: Entropy, Inc.
Client ID: 3
Lab ID: 080968-0002-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method		Prepared Date	Analyzed Date	
Aluminum	9.0	mg/sampl	0.20	6010		04 APR 95	12 APR 95	
Boron	388	mg/sampl	0.20	6010		04 APR 95	12 APR 95	
Calcium	5.6	mg/sampl	1.0	6010		04 APR 95	12 APR 95	
Cesium	45.6	mg/sampl	0.20	6020	(Modified)	04 APR 95	10 APR 95	R
Iron	2.5	mg/sampl	0.20	6010		04 APR 95	12 APR 95	
Molybdenum	18.2	mg/sampl	0.040	6010		04 APR 95	12 APR 95	
Phosphorus	11.6	mg/sampl	0.60	6010		04 APR 95	12 APR 95	
Potassium	239	mg/sampl	10.0	6010		04 APR 95	12 APR 95	
Sodium	1180	mg/sampl	20.0	6010		04 APR 95	12 APR 95	R
Strontium	0.11	mg/sampl	0.0020	6020	(Modified)	04 APR 95	10 APR 95	R
Sulfur	153	mg/sampl	0.10	6010		04 APR 95	12 APR 95	

Note R : Raised reporting limit(s) due to high analyte level(s).

ND = Not detected
NA = Not applicable

Reported By: John Disney

Approved By: Darlene Flores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

METALS

(Water - Total)

Client Name: Entropy, Inc.
Client ID: 4
Lab ID: 080968-0003-SA
Matrix: AIRTRAIN Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method		Prepared Date	Analyzed Date	
Aluminum	0.18	mg/sampl	0.020	6010		04 APR 95	12 APR 95	
Boron	3.7	mg/sampl	0.020	6010		04 APR 95	12 APR 95	
Calcium	0.49	mg/sampl	0.10	6010		04 APR 95	12 APR 95	
Cesium	0.45	mg/sampl	0.0020	6020	(Modified)	04 APR 95	10 APR 95	R
Iron	0.066	mg/sampl	0.020	6010		04 APR 95	12 APR 95	
Molybdenum	0.16	mg/sampl	0.0040	6010		04 APR 95	12 APR 95	
Phosphorus	0.087	mg/sampl	0.060	6010		04 APR 95	12 APR 95	
Potassium	2.3	mg/sampl	1.0	6010		04 APR 95	12 APR 95	
Sodium	11.9	mg/sampl	1.0	6010		04 APR 95	12 APR 95	
Strontium	0.0022	mg/sampl	0.00020	6020	(Modified)	04 APR 95	10 APR 95	
Sulfur	1.4	mg/sampl	0.010	6010		04 APR 95	12 APR 95	

Note R : Raised reporting limit(s) due to high analyte level(s).

ND = Not detected
NA = Not applicable

Reported By: John Disney Approved By: Darlene Flores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

METALS

(Water - Total)

Client Name: Entropy, Inc.
Client ID: 5
Lab ID: 080968-0004-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Aluminum	19.6	mg/sampl	0.40	6010	04 APR 95	12 APR 95	
Boron	619	mg/sampl	0.40	6010	04 APR 95	12 APR 95	
Calcium	9.4	mg/sampl	2.0	6010	04 APR 95	12 APR 95	
Cesium	61.9	mg/sampl	0.20	6020 (Modified)	04 APR 95	10 APR 95	R
Iron	4.3	mg/sampl	0.40	6010	04 APR 95	12 APR 95	
Molybdenum	25.1	mg/sampl	0.080	6010	04 APR 95	12 APR 95	
Phosphorus	19.1	mg/sampl	1.2	6010	04 APR 95	12 APR 95	
Potassium	356	mg/sampl	20.0	6010	04 APR 95	12 APR 95	
Sodium	2070	mg/sampl	40.0	6010	04 APR 95	12 APR 95	R
Strontium	0.17	mg/sampl	0.0020	6020 (Modified)	04 APR 95	10 APR 95	R
Sulfur	307	mg/sampl	0.20	6010	04 APR 95	12 APR 95	

Note R : Raised reporting limit(s) due to high analyte level(s).

ND = Not detected
NA = Not applicable

Reported By: John Disney

Approved By: Darlene Flores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

METALS

(Water - Total)

Client Name: Entropy, Inc.
Client ID: 6
Lab ID: 080968-0005-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method		Prepared Date	Analyzed Date	
Aluminum	14.9	mg/sampl	0.40	6010		04 APR 95	12 APR 95	
Boron	442	mg/sampl	0.40	6010		04 APR 95	12 APR 95	
Calcium	12.2	mg/sampl	2.0	6010		04 APR 95	12 APR 95	
Cesium	94.3	mg/sampl	2.0	6020	(Modified)	04 APR 95	10 APR 95	R
Iron	4.9	mg/sampl	0.40	6010		04 APR 95	12 APR 95	
Molybdenum	36.8	mg/sampl	0.080	6010		04 APR 95	12 APR 95	
Phosphorus	27.1	mg/sampl	1.2	6010		04 APR 95	12 APR 95	
Potassium	397	mg/sampl	20.0	6010		04 APR 95	12 APR 95	
Sodium	1960	mg/sampl	40.0	6010		04 APR 95	12 APR 95	R
Strontium	0.22	mg/sampl	0.0020	6020	(Modified)	04 APR 95	10 APR 95	R
Sulfur	843	mg/sampl	0.20	6010		04 APR 95	12 APR 95	

Note R : Raised reporting limit(s) due to high analyte level(s).

ND = Not detected
NA = Not applicable

Reported By: John Disney

Approved By: Darlene Flores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
080968-0001-SA	AQUEOUS	ICP-AT	04 APR 95-QW	04 APR 95-QW
080968-0001-SA	AQUEOUS	6020M-AIR	04 APR 95-QW	04 APR 95-QW
080968-0002-SA	AQUEOUS	ICP-AT	04 APR 95-QW	04 APR 95-QW
080968-0002-SA	AQUEOUS	6020M-AIR	04 APR 95-QW	04 APR 95-QW
080968-0003-SA	AQUEOUS	ICP-AT	04 APR 95-QW	04 APR 95-QW
080968-0003-SA	AQUEOUS	6020M-AIR	04 APR 95-QW	04 APR 95-QW
080968-0004-SA	AQUEOUS	ICP-AT	04 APR 95-QS	04 APR 95-QS
080968-0004-SA	AQUEOUS	6020M-AIR	04 APR 95-QS	04 APR 95-QS
080968-0005-SA	AQUEOUS	ICP-AT	04 APR 95-QS	04 APR 95-QS
080968-0005-SA	AQUEOUS	6020M-AIR	04 APR 95-QS	04 APR 95-QS

Quanterra Environmental Services

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 080968

Test: ICP-SCAN-6010-AT ICP Quantitative Scan (27 Total Metals)
Method: 6010
Matrix: AQUEOUS
QC Lot: 04 APR 95-QW QC Run: 04 APR 95-QW

Analyte	Result	Units	Reporting Limit
Aluminum	ND	mg/Sa	0.020
Boron	ND	mg/Sa	0.020
Calcium	ND	mg/Sa	0.10
Iron	ND	mg/Sa	0.020
Molybdenum	ND	mg/Sa	0.0040
Phosphorus	ND	mg/Sa	0.060
Potassium	ND	mg/Sa	1.0
Sodium	ND	mg/Sa	1.0
Sulfur	ND	mg/Sa	0.010

QC Lot: 04 APR 95-QS QC Run: 04 APR 95-QS

Analyte	Result	Units	Reporting Limit
Aluminum	ND	mg/Sa	0.020
Boron	ND	mg/Sa	0.020
Calcium	ND	mg/Sa	0.10
Iron	ND	mg/Sa	0.020
Molybdenum	ND	mg/Sa	0.0040
Phosphorus	ND	mg/Sa	0.060
Potassium	ND	mg/Sa	1.0
Sodium	ND	mg/Sa	1.0
Sulfur	ND	mg/Sa	0.010

Test: 6020M-AIR ICPMS Quantitative Scan (AirTrain)
Method: 6020 (Modified)
Matrix: AQUEOUS
QC Lot: 04 APR 95-QW QC Run: 04 APR 95-QW

Analyte	Result	Units	Reporting Limit
Cesium	ND	mg/sample	0.00020
Strontium	ND	mg/sample	0.00020

ND = Not Detected

Quanterra Environmental Services

METHOD BLANK REPORT
Metals Analysis and Preparation (cont.)
Project: 080968

Test: ICP-SCAN-6010-AT ICP Quantitative Scan (27 Total Metals) (cont.)
Method: 6010
Matrix: AQUEOUS

QC Lot: 04 APR 95-QS QC Run: 04 APR 95-QS

Analyte	Result	Units	Reporting Limit
Cesium	ND	mg/sample	0.00020
Strontium	ND	mg/sample	0.00020

ND = Not Detected

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 080968

Category: ICP-AT ICP Metals
Matrix: AQUEOUS
QC Lot: 04 APR 95-QW
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Aluminum	2.00	1.96	1.97	1.97	98	80-120	0.7	20
Antimony	0.500	0.473	0.478	0.476	95	80-120	0.8	20
Arsenic	0.500	0.463	0.452	0.458	92	80-120	2.3	20
Barium	2.00	1.99	1.97	1.98	99	80-120	0.6	20
Beryllium	0.0500	0.0507	0.0505	0.0506	101	80-120	0.4	20
Boron	1.00	0.969	0.962	0.966	97	80-120	0.6	20
Cadmium	0.0500	0.0459	0.0476	0.0467	93	80-120	3.6	20
Calcium	100	95.1	94.8	95.0	95	80-120	0.4	20
Chromium	0.200	0.195	0.194	0.195	97	80-120	0.5	20
Cobalt	0.500	0.484	0.485	0.485	97	80-120	0.2	20
Copper	0.250	0.247	0.247	0.247	99	80-120	0.0	20
Iron	1.00	0.977	0.975	0.976	98	80-120	0.2	20
Lead	0.500	0.490	0.496	0.493	99	80-120	1.3	20
Lithium	0.200	0.199	0.199	0.199	99	80-120	0.1	20
Magnesium	50.0	48.1	48.0	48.1	96	80-120	0.0	20
Manganese	0.500	0.483	0.482	0.483	97	80-120	0.1	20
Molybdenum	0.200	0.196	0.194	0.195	97	80-120	0.9	20
Nickel	0.500	0.488	0.485	0.486	97	80-120	0.6	20
Potassium	50.0	48.2	48.4	48.3	97	80-120	0.5	20
Selenium	2.00	1.93	1.96	1.95	97	80-120	1.4	20
Silver	0.0500	0.0450	0.0454	0.0452	90	80-120	0.7	20
Sodium	100	97.6	97.6	97.6	98	80-120	0.0	20
Thallium	2.00	1.96	1.94	1.95	98	80-120	1.2	20
Tin	4.00	3.79	3.77	3.78	94	80-120	0.6	20
Titanium	2.00	1.94	1.93	1.94	97	80-120	0.5	20
Vanadium	0.500	0.481	0.481	0.481	96	80-120	0.1	20
Zinc	0.500	0.476	0.477	0.477	95	80-120	0.2	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 080968

(cont.)

Category: ICP-AT ICP Metals
Matrix: AQUEOUS
QC Lot: 04 APR 95-QS
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Aluminum	2.00	1.93	1.89	1.91	95	80-120	2.0	20
Antimony	0.500	0.438	0.439	0.439	88	80-120	0.2	20
Arsenic	0.500	0.419	0.430	0.424	85	80-120	2.5	20
Barium	2.00	1.93	1.92	1.92	96	80-120	0.5	20
Beryllium	0.0500	0.0481	0.0478	0.0480	96	80-120	0.5	20
Boron	1.00	0.933	0.925	0.929	93	80-120	0.8	20
Cadmium	0.0500	0.0404	0.0443	0.0424	85	80-120	9.2	20
Calcium	100	89.3	89.3	89.3	89	80-120	0.0	20
Chromium	0.200	0.186	0.186	0.186	93	80-120	0.0	20
Cobalt	0.500	0.458	0.458	0.458	92	80-120	0.0	20
Copper	0.250	0.238	0.237	0.237	95	80-120	0.1	20
Iron	1.00	1.02	0.931	0.973	97	80-120	8.6	20
Lead	0.500	0.465	0.456	0.461	92	80-120	2.0	20
Lithium	0.200	0.195	0.196	0.196	98	80-120	0.2	20
Magnesium	50.0	45.7	45.6	45.6	91	80-120	0.2	20
Manganese	0.500	0.461	0.459	0.460	92	80-120	0.4	20
Molybdenum	0.200	0.190	0.188	0.189	94	80-120	1.2	20
Nickel	0.500	0.462	0.456	0.459	92	80-120	1.1	20
Potassium	50.0	46.2	46.1	46.1	92	80-120	0.2	20
Selenium	2.00	1.83	1.81	1.82	91	80-120	0.6	20
Silver	0.0500	0.0422	0.0418	0.0420	84	80-120	1.0	20
Sodium	100	94.7	94.2	94.5	94	80-120	0.4	20
Thallium	2.00	1.82	1.81	1.81	91	80-120	0.1	20
Tin	4.00	3.50	3.53	3.52	88	80-120	0.8	20
Titanium	2.00	1.87	1.86	1.87	93	80-120	0.2	20
Vanadium	0.500	0.464	0.464	0.464	93	80-120	0.0	20
Zinc	0.500	0.444	0.439	0.441	88	80-120	1.2	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 080968

(cont.)

Category: 6020M-AIR Metals by ICPMS
Matrix: AQUEOUS
QC Lot: 04 APR 95-QW
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Cesium	0.100	0.100	0.101	0.100	101	80-120	1.0	20
Strontium	0.200	0.201	0.199	0.200	100	80-120	1.0	20

Category: 6020M-AIR Metals by ICPMS
Matrix: AQUEOUS
QC Lot: 04 APR 95-QS
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Cesium	0.100	0.101	0.101	0.101	101	80-120	0.0	20
Strontium	0.200	0.203	0.202	0.202	101	80-120	0.4	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

General Inorganics - Various Methods

Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 2
Lab ID: 080968-0001-SA
Matrix: AIRTRAIN Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	91.8	mg/Sampl	9.0	300.0	NA	05 APR 95 R1
Fluoride	ND	mg/Sampl	4.5	300.0	NA	05 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : Dileach from Filter and Acetone rinse fractions.
Initial volume added = 105ml; Final volume collected = 90ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 3
Lab ID: 080968-0002-SA
Matrix: AIRTRAIN Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	133	mg/Sampl	8.4	300.0	NA	05 APR 95 R1
Fluoride	7.5	mg/Sampl	4.2	300.0	NA	05 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : Dileach from Filter and Acetone rinse fractions.
Initial volume added = 100ml; Final volume collected = 84ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

The cover letter is an integral part of this report.
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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 4
Lab ID: 080968-0003-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	0.60	mg/Sampl	0.083	300.0	NA	06 APR 95 R1
Fluoride	0.14	mg/Sampl	0.083	300.0	NA	06 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : Dileach from Filter and Acetone rinse fractions. Initial volume added = 100ml; Final volume collected = 86ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 5
Lab ID: 080968-0004-SA
Matrix: AIRTRAIN Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	224	mg/Sampl	21.5	300.0	NA	05 APR 95 R1
Fluoride	ND	mg/Sampl	21.5	300.0	NA	05 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : Dileach from Filter and Acetone rinse fractions. Initial volume added = 100ml; Final volume collected = 83ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

The cover letter is an integral part of this report.
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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 6
Lab ID: 080968-0005-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	333	mg/Sampl	22.0	300.0	NA	06 APR 95 R1
Fluoride	18.1	mg/Sampl	8.8	300.0	NA	06 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : Dileach from Filter and Acetone rinse fractions. Initial volume added = 100ml; Final volume collected = 88ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 2-Nitric Probe Rinse
Lab ID: 080968-0001-DU
Matrix: AQUEOUS Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	26.8	mg/Sampl	2.2	300.0	NA	10 APR 95 R1
Fluoride	ND	mg/Sampl	2.2	300.0	NA	10 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : HNO3 fraction, volume measured = 175ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 3-Nitric Probe Rinse
Lab ID: 080968-0002-DU
Matrix: AQUEOUS Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	9.3	mg/Sampl	0.63	300.0	NA	10 APR 95 R1
Fluoride	ND	mg/Sampl	0.63	300.0	NA	10 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : HNO3 fraction, volume measured = 126ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 4-Nitric Probe Rinse
Lab ID: 080968-0003-DU
Matrix: AQUEOUS Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	2.7	mg/Sampl	0.78	300.0	NA	10 APR 95 R1
Fluoride	ND	mg/Sampl	0.78	300.0	NA	10 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : HNO3 fractions, volume measured = 62ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 5-Nitric Probe Rinse
Lab ID: 080968-0004-DU
Matrix: AQUEOUS Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	8.7	mg/Sampl	1.7	300.0	NA	10 APR 95 R1
Fluoride	ND	mg/Sampl	0.69	300.0	NA	10 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : HNO3 fractions, volume measure = 138ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

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Quanterra Environmental Services

Ion Chromatography Scan, Multiple elements

Client Name: Entropy, Inc.
Client ID: 6-Nitric Probe rinse
Lab ID: 080968-0005-DU
Matrix: AQUEOUS Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	22.6	mg/Sampl	2.5	300.0	NA	10 APR 95 R1
Fluoride	ND	mg/Sampl	2.5	300.0	NA	10 APR 95 G

Note R : Raised reporting limit(s) due to high analyte level(s).

Note 1 : HNO3 fractions, volume measure = 201ml.

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

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Quanterra Environmental Services

Ammonia

Method 350.1

Client Name: Entropy, Inc.
Matrix: AIRTRAIN
Units: mg/sample

Received: 21 MAR 95
Authorized: 21 MAR 95

Lab ID	Client ID	Result	Reporting Limit	Date Prepared	Date Analyzed	
080968-0001-SA	2	7.0	1.9	NA	07 APR 95	R
080968-0002-SA	3	10.2	1.3	NA	07 APR 95	R
080968-0003-SA	4	23.0	1.6	NA	07 APR 95	R
080968-0004-SA	5	3.8	1.6	NA	07 APR 95	R
080968-0005-SA	6	0.056	0.033	NA	07 APR 95	
080968-0006-SA	CEM-Inlet-1	13.1	1.1	NA	06 APR 95	R

Note R : Raised reporting limit(s) due to high analyte level(s).

ND = Not detected
NA = Not applicable

Reported By: Hamid Foolad

Approved By: Josefina Jones

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Quanterra Environmental Services

Volume

Method

Client Name: Entropy, Inc.
Matrix: AIRTRAIN
Units: ml

Received: 28 MAR 95
Authorized: 21 MAR 95

Lab ID	Client ID	Result	Reporting Limit	Date Prepared	Date Analyzed
080968-0006-SA	CEM-Inlet-1	212	NA	NA	06 APR 95

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Josefina Jones

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Quanterra Environmental Services

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
080968-0001-SA	AQUEOUS	NH3-A	07 APR 95-A	07 APR 95-A
080968-0001-SA	AQUEOUS	IC-A	05 APR 95-K	05 APR 95-K
080968-0001-DU	AQUEOUS	IC-A	10 APR 95-J	10 APR 95-J
080968-0002-SA	AQUEOUS	NH3-A	07 APR 95-A	07 APR 95-A
080968-0002-SA	AQUEOUS	IC-A	05 APR 95-K	05 APR 95-K
080968-0002-DU	AQUEOUS	IC-A	10 APR 95-J	10 APR 95-J
080968-0003-SA	AQUEOUS	NH3-A	07 APR 95-A	07 APR 95-A
080968-0003-SA	AQUEOUS	IC-A	06 APR 95-J	06 APR 95-J
080968-0003-DU	AQUEOUS	IC-A	10 APR 95-J	10 APR 95-J
080968-0004-SA	AQUEOUS	NH3-A	07 APR 95-A	07 APR 95-A
080968-0004-SA	AQUEOUS	IC-A	05 APR 95-K	05 APR 95-K
080968-0004-DU	AQUEOUS	IC-A	10 APR 95-J	10 APR 95-J
080968-0005-SA	AQUEOUS	NH3-A	07 APR 95-A	07 APR 95-A
080968-0005-SA	AQUEOUS	IC-A	05 APR 95-K	05 APR 95-K
080968-0005-DU	AQUEOUS	IC-A	10 APR 95-J	10 APR 95-J
080968-0006-SA	AQUEOUS	NH3-A	06 APR 95-A	06 APR 95-A

Quanterra Environmental Services

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: NH3-A			
Matrix: AIRTRAIN			
QC Lot: 07 APR 95-A QC Run: 07 APR 95-A			
Ammonia as N	ND	mg/L	0.10
Test: IC-SCAN-A			
Matrix: AIRTRAIN			
QC Lot: 05 APR 95-K QC Run: 05 APR 95-K			
Chloride	ND	mg/L	0.50
Fluoride	ND	mg/L	0.50
Test: IC-SCAN-A			
Matrix: AQUEOUS			
QC Lot: 10 APR 95-J QC Run: 10 APR 95-J			
Chloride	ND	mg/L	0.50
Fluoride	ND	mg/L	0.50
Test: IC-SCAN-A			
Matrix: AIRTRAIN			
QC Lot: 06 APR 95-J QC Run: 06 APR 95-J			
Chloride	ND	mg/L	0.50
Fluoride	ND	mg/L	0.50
Test: NH3-A			
Matrix: AQUEOUS			
QC Lot: 06 APR 95-A QC Run: 06 APR 95-A			
Ammonia as N	ND	mg/L	0.10

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: NH3-A Matrix: AQUEOUS QC Lot: 07 APR 95-A Concentration Units: mg/L								
Ammonia as N	2.0	2.01	2.04	2.03	101	90-110	1.5	10.0
Category: IC-A Matrix: AQUEOUS QC Lot: 05 APR 95-K Concentration Units: mg/L								
Fluoride	5.0	5.11	5.17	5.14	103	90-110	1.1	10.0
Chloride	5.0	4.77	4.82	4.80	96	90-110	1.0	10.0
Nitrite (as N)	3.0	NA	NA	NC	NC	90-110	NC	10.0
Bromide	5.0	4.81	4.85	4.83	97	90-110	0.8	10.0
Nitrate (as N)	3.0	NA	NA	NC	NC	90-110	NC	10.0
Orthophosphate (as P)	10	NA	NA	NC	NC	90-110	NC	10.0
Sulfate	15	NA	NA	NC	NC	90-110	NC	10.0
Category: IC-A Matrix: AQUEOUS QC Lot: 10 APR 95-J Concentration Units: mg/L								
Fluoride	5.0	5.08	5.03	5.05	101	90-110	1.0	10.0
Chloride	5.0	4.75	4.74	4.75	95	90-110	0.2	10.0
Nitrite (as N)	3.0	NA	NA	NC	NC	90-110	NC	10.0
Bromide	5.0	4.80	4.80	4.80	96	90-110	0.2	10.0
Nitrate (as N)	3.0	NA	NA	NC	NC	90-110	NC	10.0
Orthophosphate (as P)	10	NA	NA	NC	NC	90-110	NC	10.0
Sulfate	15	NA	NA	NC	NC	90-110	NC	10.0
Category: IC-A Matrix: AQUEOUS QC Lot: 06 APR 95-J Concentration Units: mg/L								
Fluoride	5.0	5.22	5.18	5.20	104	90-110	0.8	10.0
Chloride	5.0	4.80	4.81	4.80	96	90-110	0.2	10.0

ND = Not detected.
NC = Not calculated, calculation not applicable.
NA = Not applicable.

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: IC-A								
Matrix: AQUEOUS								
QC Lot: 06 APR 95-J								
Concentration Units: mg/L								
Nitrite (as N)	3.0	NA	NA	NC	NC	90-110	NC	10.0
Bromide	5.0	4.90	4.86	4.88	98	90-110	0.7	10.0
Nitrate (as N)	3.0	NA	NA	NC	NC	90-110	NC	10.0
Orthophosphate (as P)	10	NA	NA	NC	NC	90-110	NC	10.0
Sulfate	15	NA	NA	NC	NC	90-110	NC	10.0
Category: NH3-A								
Matrix: AQUEOUS								
QC Lot: 06 APR 95-A								
Concentration Units: mg/L								
Ammonia as N	2.0	2.02	2.04	2.03	102	90-110	0.6	10.0

ND = Not detected.
NC = Not calculated, calculation not applicable.
NA = Not applicable.

Calculations are performed before rounding to avoid round-off errors in calculated results.

Anions by Ion Chromatography - Method EPA 26 (Modified)

Quanterra Environmental Services

Anions by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 2
Lab ID: 080968-0001-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chlorine	3.8	mg/sampl	1.1	EPA 26 (Mod)	NA	17 APR 95 G
Fluorine	ND	mg/sampl	1.1	EPA 26 (Mod)	NA	17 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Anions by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 3
Lab ID: 080968-0002-SA
Matrix: AIRTRAIN Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chlorine	ND	mg/sampl	1.4	EPA 26 (Mod)	NA	17 APR 95 G
Fluorine	ND	mg/sampl	1.4	EPA 26 (Mod)	NA	17 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Anions by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 4
Lab ID: 080968-0003-SA
Matrix: AIRTRAIN Sampled: 21 MAR 95 Received: 21 MAR 95
Authorized: 21 MAR 95 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chlorine	4.3	mg/sampl	1.5	EPA 26 (Mod)	NA	17 APR 95 G
Fluorine	ND	mg/sampl	1.5	EPA 26 (Mod)	NA	17 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Anions by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 5
Lab ID: 080968-0004-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chlorine	ND	mg/sampl	1.6	EPA 26 (Mod)	NA	17 APR 95 G
Fluorine	ND	mg/sampl	1.6	EPA 26 (Mod)	NA	17 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Anions by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 6
Lab ID: 080968-0005-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chlorine	ND	mg/sampl	1.6	EPA 26 (Mod)	NA	17 APR 95 G
Fluorine	ND	mg/sampl	1.6	EPA 26 (Mod)	NA	17 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

QC LOT ASSIGNMENT REPORT
Air Toxics Laboratory

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
080968-0001-SA	AQUEOUS	E26-IC-AIR	17 APR 95-J	17 APR 95-J
080968-0002-SA	AQUEOUS	E26-IC-AIR	17 APR 95-J	17 APR 95-J
080968-0003-SA	AQUEOUS	E26-IC-AIR	17 APR 95-J	17 APR 95-J
080968-0004-SA	AQUEOUS	E26-IC-AIR	17 APR 95-J	17 APR 95-J
080968-0005-SA	AQUEOUS	E26-IC-AIR	17 APR 95-J	17 APR 95-J

Quanterra Environmental Services

METHOD BLANK REPORT
Air Toxics Laboratory
Project: 080968

Test: EPA26-IC-AIR Anions by Ion Chromatography
Method: EPA 26 (Modified)
Matrix: AQUEOUS
QC Lot: 17 APR 95-J QC Run: 17 APR 95-J

Analyte	Result	Units	Reporting Limit
Chlorine	ND	mg/sample	0.50
Fluorine	ND	mg/sample	0.50

ND = Not Detected

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Air Toxics Laboratory
Project: 080968

Category: E26-IC-AIR Ion Chromatography Inorganics
Matrix: AQUEOUS
QC Lot: 17 APR 95-J
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Chlorine	5.00	4.95	4.70	4.82	96	85-115	5.1	15
Fluorine	5.00	5.12	4.95	5.04	101	85-115	3.4	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

Inorganic Acids by Ion Chromatography - Method EPA 26 (Modified)

Quanterra Environmental Services

Inorganic Acids by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 2
Lab ID: 080968-0001-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride, as HCl	ND	mg/sampl	0.97	EPA 26 (MOD)	NA	13 APR 95 G1
Fluoride, as HF	ND	mg/sampl	0.99	EPA 26 (MOD)	NA	13 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

Note 1 : H2SO4 fraction, volume measured = 377ml.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Inorganic Acids by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 3
Lab ID: 080968-0002-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride, as HCl	ND	mg/sampl	0.67	EPA 26 (MOD)	NA	13 APR 95 G1
Fluoride, as HF	ND	mg/sampl	0.69	EPA 26 (MOD)	NA	13 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

Note 1 : H2SO4 fraction, volume measured = 262ml.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Inorganic Acids by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 4
Lab ID: 080968-0003-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride, as HCl	ND	mg/sampl	0.81	EPA 26 (MOD)	NA	13 APR 95 G1
Fluoride, as HF	ND	mg/sampl	0.83	EPA 26 (MOD)	NA	13 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

Note 1 : H2SO4 fraction, volume measured = 316.5ml.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Inorganic Acids by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 5
Lab ID: 080968-0004-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride, as HCl	ND	mg/sampl	0.81	EPA 26 (MOD)	NA	13 APR 95 G1
Fluoride, as HF	ND	mg/sampl	0.83	EPA 26 (MOD)	NA	13 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

Note 1 : H2SO4 fraction, volume measured = 315ml.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

Inorganic Acids by Ion Chromatography

Client Name: Entropy, Inc.
Client ID: 6
Lab ID: 080968-0005-SA
Matrix: AIRTRAIN
Authorized: 21 MAR 95

Sampled: 21 MAR 95
Prepared: See Below

Received: 21 MAR 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride, as HCl	ND	mg/sampl	0.84	EPA 26 (MOD)	NA	13 APR 95 G1
Fluoride, as HF	ND	mg/sampl	0.87	EPA 26 (MOD)	NA	13 APR 95 G

Note G : Reporting Limit raised due to matrix interference.

Note 1 : H2SO4 fraction, volume measured = 329ml.

ND = Not detected
NA = Not applicable

Reported By: Josefina Jones

Approved By: Steve Valmores

The cover letter is an integral part of this report.
Rev 230787

Quanterra Environmental Services

QC LOT ASSIGNMENT REPORT
Air Toxics Laboratory

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
080968-0001-SA	AQUEOUS	E26-IC-AIR	13 APR 95-J	13 APR 95-J
080968-0002-SA	AQUEOUS	E26-IC-AIR	13 APR 95-J	13 APR 95-J
080968-0003-SA	AQUEOUS	E26-IC-AIR	13 APR 95-J	13 APR 95-J
080968-0004-SA	AQUEOUS	E26-IC-AIR	13 APR 95-J	13 APR 95-J
080968-0005-SA	AQUEOUS	E26-IC-AIR	13 APR 95-J	13 APR 95-J

Quanterra
Environmental Services

METHOD BLANK REPORT
Air Toxics Laboratory
Project: 080968

Test: EPA26-ACIDS-IC-AIR Inorganic Acids by Ion Chromatography
Method: EPA 26 (MOD)
Matrix: AQUEOUS
QC Lot: 13 APR 95-J QC Run: 13 APR 95-J

Analyte	Result	Units	Reporting Limit
Chloride, as HCl	ND	mg/sample	0.50
Fluoride, as HF	ND	mg/sample	0.50

ND = Not Detected

Quanterra Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
Air Toxics Laboratory
Project: 080968

Category: E26-IC-AIR Ion Chromatography Inorganics
Matrix: AQUEOUS
QC Lot: 13 APR 95-J
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Bromide	5.00	5.04	5.07	5.06	101	85-115	0.4	15
Chloride	5.00	5.11	5.14	5.12	103	85-115	0.5	15
Fluoride	5.00	4.70	4.70	4.70	94	85-115	0.0	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

Appendix E
Equipment Calibration Records and Calibration Gas Certificates

BEST AVAILABLE COPY

SAMPLING EQUIPMENT AUDIT WHC-SD-WM-VI-032

Revision 0

Client: Lockheed Idaho

Plant: US Bureau of Mines

Job No. 13911

City/State: Albany, Oregon

Team Leader: SCG

Test Location: All

BAROMETER

Barometer (Van) No. _____ Checked OK? (✓) ___ Shop Auditor _____

Entropy In-House Ref. Barometer _____ "Hg vs Van Barometer _____ "Hg

Date Compared _____ Dev. _____ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Test Loc. Elevation Above Ground (Van) _____ Ft. Date _____ Field Auditor _____

Field Barometric Pressure Reduced for Test Location Elevation by _____ "Hg

Ref. Therm. Initial Ambient Temp., °F ____

Date _____ Auditor _____

THERMOMETERS	Allowable Deviation From Ambient	Ambient Temperature, °F				✓ OK
Dry Gas Meter	± 5.4 °F	_____	(Meterbox I.D. _____)			___
Impinger Exit	± 2.0 °F	_____	_____	_____	_____	___
Filter Box	± 5.4 °F	_____	_____	_____	_____	___

THERMOCOUPLES

TC No. / °F	✓ OK	TC No. / °F	✓ OK	TC No. / °F	✓ OK	TC No. / °F	✓ OK	TC No. / °F	✓ OK
/	___	/	___	/	___	/	___	/	___
(Including Temp. Change and Direction)		(Including Temp. Change and Direction)		(Including Temp. Change and Direction)		(Including Temp. Change and Direction)		(Including Temp. Change and Direction)	
Auditor _____		Auditor _____		Auditor _____		Auditor _____		Auditor _____	

Allowable Deviation from Ambient: ± 8.0°F * (or ± 2.0°F) **

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.

** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX

I.D. N30 Gamma (Y) 0.9850 ΔH@ 1.8243

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? N/A

Barometric Pressure (P_{bar}) 29.3 Auditor SCG Date 3/8/95

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 822.503	Final 70	0.96 * Y = 0.9456
Initial 815.000	Initial 64	1.04 * Y = 1.0244

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
Vm = 7.503	Tm = 67	10	0

$$Y_c = \frac{[10 + (0 / 60)]}{7.503} * \left[\frac{0.0319\,(67 + 460)}{29.3}\right]^{.5} = 1.01$$

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (✓) Yes ✓ No ___

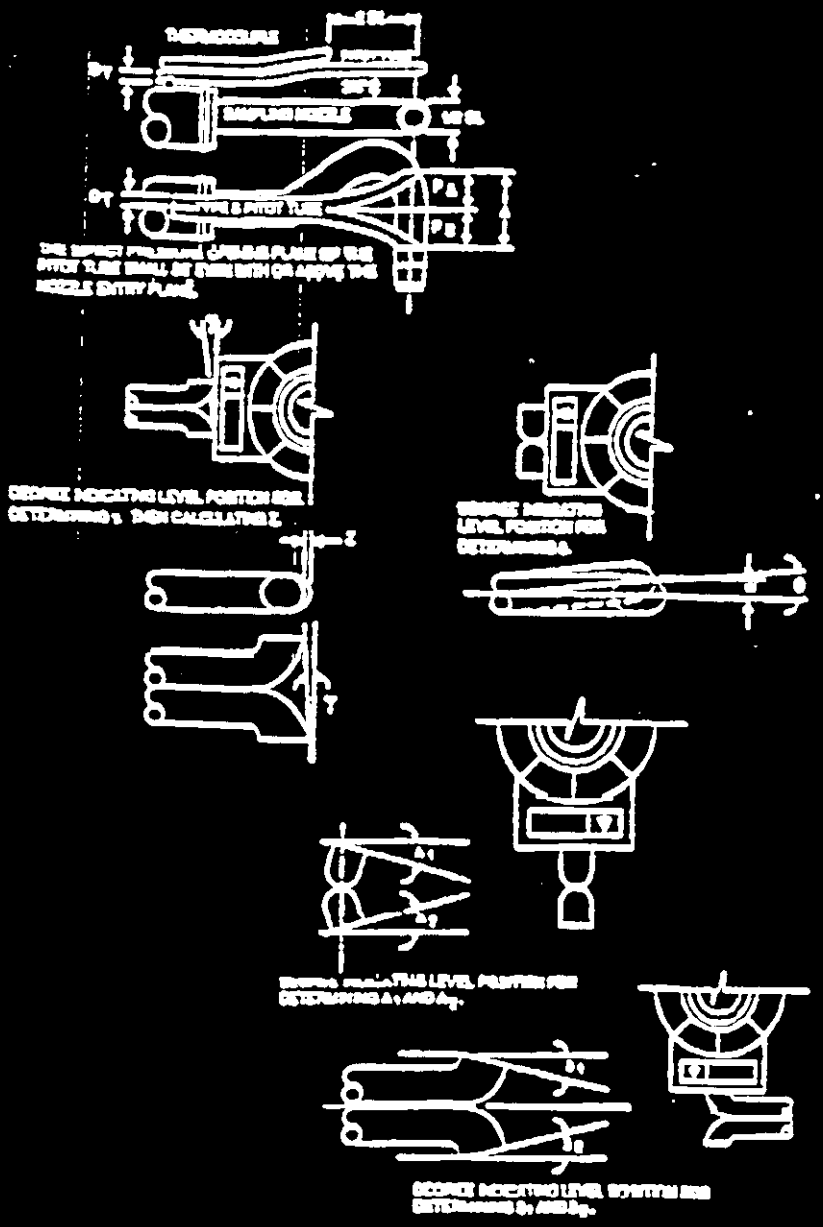
Ideal Sampling Rate = 0.75

Positive Pressure Leak Check OK? Yes ___ No ___

E 2

F-1113 rev. 5-93

PITOT TUBE INSPECTION



level?	YES
obstructions?	NONE
damaged?	NONE
$-10° < \alpha_1 < +10°$	0
$-10° < \alpha_2 < +10°$	0
$-5° < \beta 1 < +5°$	0
$-5° < \beta 2 < +5°$	0
γ	1°
θ	0
A	1.000
$1.05\,D_t < P_a < 1.5\,D_t$	.501
$1.05\,D_t < P_b < 1.5\,D_t$	.497
$3/16" < D_t < 3/8"$	.375
$A \tan\gamma < 0.125"$	.017
$A \tan\theta < 0.03125"$	0
$P_a = P_b \pm 0.063"$	YES

See 40 CFR 60, Vol. 42 No. 160 EPA Method 2. Verify the minimum 2-inch setback of the thermocouple and the minimum 3/4-inch separation between the pitot tube and the nozzle as shown at the top of this page.

Comments: CXP-1

I certify that pitot tube/probe number _____ meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84.

Signature C. Blanton

Date 9-28-93

R-0028 rev. 3/90

ENTROPY

THERMOCOUPLE CALIBRATION

THERMOCOUPLE No. 38

Date 4/5/95

Calibrated By [illegible]

Barometric Pressure, "Hg 29.85

Ambient Temperature, °F 70.0

Calibration System Used	Ref. Digital Thermometer & Thermocouple I.D. Nos.	Reference Thermocouple Temperature (T_r °F)	Test Digital Thermometer I.D. No.	Test Thermocouple Temperature (T_t °F)	Temperature Diff., % (Allowable: ≤ 1.5 %)
ICE BATH	L001	31.0	F27	31.0	0
		31.0		32.0	-0.2
		31.0		32.0	-0.2
BOILING WATER	L001	212	F27	212	0
		212		212	0
		212		214	-0.29
BOILING OIL	L001	415	F27	414	.11
		418		417	.11
		418		418	0

$$\text{Temperature Difference} = \frac{T_r - T_t}{T_r + 460} * 100$$

THERMOCOUPLE CALIBRATION

THERMOCOUPLE No. 39

Date 4/5/95

Calibrated By [illegible]

Barometric Pressure, "Hg 29.85

Ambient Temperature, °F 70.0

Calibration System Used	Ref. Digital Thermometer & Thermocouple I.D. Nos.	Reference Thermocouple Temperature (T_r °F)	Test Digital Thermometer I.D. No.	Test Thermocouple Temperature (T_t °F)	Temperature Diff., % (Allowable: ≤ 1.5 %)
ICE BATH	L001	32.0	F27	31.0	.20
		32.0		31.0	.20
		32.0		32.0	0
BOILING WATER	L001	214	F27	213.0	0.14
		215		215.0	0
		216		215.0	0.14
BOILING OIL	L001	398	F27	399	−0.11
		401		400	0.11
		402		400	0.23

$$\text{Temperature Difference} = \frac{T_r - T_t}{T_r + 460} \times 100$$

R-0023 Rev. 11-93

DRY GAS METER CALIBRATION RECORD

Test Location: EEI Huntington Lab Date: 4/7/95 Calibrated By: MIKE C

SECONDARY STANDARD	GAS METER BEING TESTED
DGM ID: 3586003 G: 0.9999 Date: 11/1/94	DGM ID: N-30

TIME	Flow (cfm)	Vsi (cu. ft)	Ts (F)	DPs ("H2O)	Vsf (cu. ft)	Vmi (cu. ft)	Tm (F)	Pbar ("Hg)	Vmf (cu. ft)	Gi	(Gimax-Gimin) ≤ 0.010	Giavg	Giavg / Gavg = 1 ± 0.02
10	0.3	403.360	69	0.00	406.050	869.500	71	29.92	872.275	0.973			
10	0.3	406.050	69	0.00	408.778	872.275	74	29.92	875.115	0.97	0.004	0.971	0.999
10	0.3	408.778	69	0.00	411.450	875.115	78	29.92	877.920	0.969			
10	0.5	418.475	69	0.00	423.595	885.355	85	29.92	890.791	0.97			
10	0.5	423.595	69	0.00	428.712	890.791	86	29.92	896.260	0.966	0.004	0.967	0.996
10	0.5	428.712	69	0.00	433.818	896.260	87	29.92	901.727	0.966			
10	0.8	433.818	69	0.00	440.957	901.727	88	29.92	909.371	0.967			
10	0.8	440.957	69	0.00	448.108	909.371	88	29.92	916.995	0.972	0.007	0.971	0.999
10	0.8	458.155	70	0.00	465.282	927.670	89	29.92	935.250	0.974			
10	1.0	465.282	70	0.00	474.793	935.250	91	29.92	945.372	0.977			
10	1.0	474.793	70	0.00	484.327	945.372	93	29.92	955.540	0.978	0.001	0.977	1.006
10	1.0	484.327	70	0.00	493.850	955.540	93	29.92	965.705	0.977			

Orifice Setting "H2O	dH@ (68 F)	(60 F)
0.25	1.9414	1.97
0.25	1.8756	1.9032
0.25	1.9411	1.9697
0.9	1.8809	1.9086
0.9	1.8771	1.9048
0.9	1.8819	1.9097
1.8511	1.9795	2.0086
1.8511	1.9694	1.9984
1.8511	1.9878	2.0171
3.2	1.9222	1.9506
3.2	1.9079	1.936
3.2	1.9129	1.9411
	1.9231	1.9515

G - Gamma factor for secondary standard.
Vsi, Vsf - Initial and final volume readings on secondary standard (cu. ft).
Ts - Temperature of secondary standard meter (Deg. F).
DPs - Pressure of secondary standard meter (in. H2O).
Vmi, Vmf - Initial and final volume readings on tested meter (cu. ft).
Tm - Temperature of tested gas meter (Deg. F).
Pbar - Barometric Pressure (in. Hg).

$$Vstd = (Vsf - Vsi)(G)(17.64)[Pbar + (DPs/13.6)]/(Ts + 460)$$

$$Gi = Vstd/[(Vmf - Vmi)(17.64)(Pbar)/(Tm + 460)]$$

OVERALL GAMMA, Gavg: 0.972

PREVIOUS GAMMA: 0.9850

DATE: 10/5/94

DEVIATION FROM PREVIOUS GAMMA: -1.38%

PRETEST CALIBRATION ☐

POSTTEST CALIBRATION ☐

FULL TEST CALIBRATION ☒

DRY GAS METER CALIBRATION RECORD

Test Location: BEI Huntington Lab Date: 10/5/94 Calibrated By: MIKE C

SECONDARY STANDARD	GAS METER BEING TESTED
DGM ID: 6838323 G: 0.9963 Date: 7/12/94	DGM ID: M-30

TIME	Flow (cfm)	Vsi (cu. ft)	Ts (F)	DPs ("H2O)	Vsf (cu. ft)	Vmi (cu. ft)	Tm (F)	Pbar ("Hg)	Vmf (cu. ft)	Gi	(Gimax-Gimin) ≤ 0.010	Giavg	Giavg / Gavg = 1 ± 0.02	Orifice Setting "H2O	dH@ (68 F)	(60 F
10	0.3	740.900	71	0.00	743.768	191.700	91	30.06	194.740	0.975	0.004	0.975	0.990	0.25	1.6639	1.686
10	0.3	743.768	71	0.00	746.610	194.740	91	30.06	197.760	0.973				0.25	1.693	1.717
10	0.3	746.610	71	0.00	749.442	197.760	92	30.06	200.762	0.977				0.25	1.7024	1.727
10	0.5	707.970	71	0.00	713.156	157.292	82	30.06	162.628	0.988	0.003	0.986	1.001	0.9	1.8625	1.889
10	0.5	713.156	71	0.00	718.314	162.628	89	30.06	168.022	0.985				0.9	1.8575	1.884
10	0.5	779.320	72	0.00	784.478	232.100	97	30.06	237.565	0.985				0.9	1.8359	1.862
10	0.8	718.774	72	0.00	726.155	168.497	91	30.06	176.229	0.985	0.003	0.987	1.002	1.8584	1.8734	1.90
10	0.8	726.155	72	0.00	733.414	176.229	93	30.06	183.838	0.988				1.8584	1.9297	1.958
10	0.8	733.414	72	0.00	740.698	183.838	94	30.06	191.498	0.987				1.8584	1.9114	1.939
10	1.0	749.848	73	0.00	759.648	201.200	95	30.06	211.445	0.992	0.001	0.992	1.007	3.2	1.8247	1.851
10	1.0	759.648	74	0.00	769.315	211.445	98	30.06	221.595	0.992				3.2	1.8691	1.896
10	1.0	769.315	74	0.00	778.985	221.595	99	30.06	231.748	0.993				3.2	1.8676	1.895
															1.8243	1.851

OVERALL GAMMA, Gavg: 0.985

PREVIOUS GAMMA: 1.0040

DATE: 4/20/94

DEVIATION FROM PREVIOUS GAMMA: -1.93%

G - Gamma factor for secondary standard.
Vsi, Vsf - Initial and final volume readings on secondary standard (cu. ft).
Ts - Temperature of secondary standard meter (Deg. F).
DPs - Pressure of secondary standard meter (in. H2O).
Vmi, Vmf - Initial and final volume readings on tested meter (cu. ft).
Tm - Temperature of tested gas meter (Deg. F).
Pbar - Barometric Pressure (in. Hg).

$$Vstd = (Vsf - Vsi)(G)(17.64)[Pbar + (DPs/13.6)]/(Ts + 460)$$

$$Gi = Vstd/[(Vmf - Vmi)(17.64)(Pbar)/(Tm + 460)]$$

PRETEST CALIBRATION ☐

POSTTEST CALIBRATION ☐

FULL TEST CALIBRATION ☒

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENTROPY
5932 BOLSA AVENUE SUITE 105
HUNTINGTON BEACH, CA 92649

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 9841
Project # 33314.005

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September 1993.

Cylinder Number AAL3157 **Certification Date** 09/19/94 **Exp. Date** 09/19/97
Cylinder Pressure+ 1800 PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(CARBON DIOXIDE)	18.02 %	± 1 % NIST Traceable
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
CRM 1675	05/95	ALM001136	14.00% C02 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-135C / 56553902	08/30/94	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
CARBON DIOXIDE	Date: 09/19/94 Response Units: mv Z1= 0.00 R1= 82.2 T1= 94.4 R2= 82.2 Z2= 0.00 T2= 94.4 Z3= 0.00 T3= 94.4 R3= 82.2 Avg. Conc. of Cust Cyl. 18.02 %	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration= Ax^3+Bx^2+Cx+D A =0.000008594 B =0.0001188 C =0.1031 D =-0.0003821
	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=
	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=

Special Notes:

Analyst: [signature]

E. P. A. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:
Scott Specialty Gases
Route 611
Plumsteadville, PA 18949
Purchase order :
06614-8H9L

Shipped to:
ENTROPY ENVIRONMENTALISTS
PO BOX 12291
RESEARCH TRIANGLE PARK, NC 27709
ATTN: SCOTT SHANKLIN

Project No 35876

Certified per E.P.A. Protocol # 2 Procedure # 2 Section # 2.0.7
Certified accuracy +/- 1 % NIST Traceable

Cylinder number IL2191

Cylinder pressure
1900 psig.

Date of assay: 3-13-92

Expiration date: 6-13-93

Component	Certified concentration
NITRIC OXIDE	3970 ppm
OXIDES OF NITROGEN	3980
NITROGEN	Balance

Standard
Type GMIS
Concentration 2611 ppm
Cylinder # AAL14479

Analyzer
Make : TECO
Model : 10
Serial number : 9741-111-8
Analytical principle : Chemiluminesence
Date of calibration : 1-14-92

Raw data units: VOLTS

			Concentration of Customer Cylinder
First analysis		3-6-92	
Z1=0.0000	R1=8.0280	T1=7.3020	3958 ppm
R2=8.0380	Z2=0.0000	T2=7.3600	3985 ppm
Z3=0.0000	T3=7.3870	R3=8.0660	3985 ppm
Second analysis:		3-13-92	
Z1=0.0000	R1=8.0910	T1=7.3120	3933 ppm
R2=8.1090	Z2=0.0000	T2=7.3900	3966 ppm
Z3=0.0000	T3=7.3860	R3=8.0990	3969 ppm

Analyst [signature]

Approved by [signature]
Mark S. Sirinides/Ted Neeme

E 9

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENTROPY
5932 BOLSA AVENUE
SUITE 105
HUNTINTOGN BEACH, CA 92649

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 10227
Project # 34686.003

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards: Procedure G1: September 1993.

Cylinder Number AAL7205 **Certification Date** 12/20/94 **Exp. Date** 12/20/97
Cylinder Pressure+ 2000 PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(OXYGEN)	11.07%	±1% NIST TRACABLE
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
NTRM 2658	10/96	ALM017565	9.560% O2 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-335 / 850557042	12/05/94	Magnetopneumatic

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
OXYGEN	Date: 12/20/94 Response Units: mv Z1= 0.00 R1= 38.3 T1= 44.3 R2= 38.3 Z2= 0.00 T2= 44.3 Z3= 0.00 T3= 44.3 R3= 38.3 Avg. Conc. of Cust Cyl. 11.07%	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration= Ax - B A =0.2500 B =-0.003469
	Date Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=
	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z3= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=

Special Notes:

Analyst: _____

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENTROPY
5932 BOLSA AVE
SUITE 105
HUNTINGTON BEACH CA 92649

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 8345
Project # 30759.001

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September 1993.

Cylinder Number ALM005618 **Certification Date** 04-06-94 **Exp. Date** 04-06-97
Cylinder Pressure+ 2000PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
(OXYGEN)	20.06%	±1 % NIST Traceable
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
GMIS	10-94	A6513	23.53% O2 IN N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-335 / 850557042	03-30-94	Magnetopneumatic

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: OXYGEN

First Triad Analysis

Date: 04-06-94 Response Units: mv
Z1= 0.00 R1= 94.1 T1= 80.2
R2= 94.1 Z2= 0.05 T2= 80.2
Z3= 0.03 T3= 80.4 R3= 94.2
Avg. Conc. of Cust Cyl. 20.06%

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Second Triad Analysis

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Calibration Curve

Concentration= Ax + B
A =0.2500076
B =0.01135058

Concentration=

Concentration=

Special Notes:

ANALYST

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

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENTE02

TO:

HUNG DUONG
ENTROPY ENVIRONMENTALISTS INC
5932 BOLSA AVE STE 105
HUNTNGTON BEACH, CA 92649-

DATE : 11/23/94

CUSTOMER ORDER NUMBER: 9974

PAGE 1

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC109934				
			Varian Model 1860		11/22/94
Carbon dioxide	5.26 ± 0.05 %	GMIS	S/N None	11/22/97	5.26 %
		Cylinder #	Thermal Conductivity		5.25 %
Nitrogen	Balance	CC88828	Gas Chromatography		5.26 %
Cylinder Pressure: 2000 psig		@ 4.88 %	Last Cal Date: 11/16/94		Mean: 5.26 %

ppm = umole/mole   % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: M.S. Calhoun   Approved: J.T. Marrin

he 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.

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

DEC 1994

WHC-SD-WM-VI-032
Revision 0

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENTE02

TO:

HUNG DUONG
ENTROPY ENVIRONMENTALISTS INC
5932 BOLSA AVE STE 105
HUNTNGTON BEACH, CA 92649-

DATE : 11/23/94

CUSTOMER ORDER NUMBER: 9974

PAGE 1

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC42648				
Carbon dioxide	9.13 ± 0.09 %	GMIS	Varian Model 1868 S/N None	11/22/97	11/22/94 9.14 %
Nitrogen	Balance	Cylinder # CC86199	Thermal Conductivity Gas Chromatography		9.12 %
Cylinder Pressure: 2000 psig		@ 7.25 %	Last Cal Date: 11/16/94		9.12 % Mean: 9.13 %

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

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.

E 13

Scott Specialty Gases, Inc.

Shipped From: 2600 CAJON BLVD.
SAN BERNARDINO CA 92411
Phone: 909-887-2571
Fax: 909 887-0549

CERTIFICATE OF ANALYSIS

ENTROPY
SON BOI
5932 BOLSA AVE
SUITE 105
HUNTINGTON BEACH CA 92649

PROJECT #: 02-30215-001
PO#: 8429
ITEM #: 02021452 2AL
DATE: 2/21/94

CYLINDER #: AAL17891
FILL PRESSURE: 2000PSIG
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +-2%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON MONOXIDE	30.	PPM	30.1	PPM
NITROGEN		BAL		BAL

2000PSIG BIN#1 02-25-94
NTRM 1678 45.76 PPM

ANALYTICAL METHOD: NDIR

NIST TRACEABILITY: NTRM 1678

ANALYST: M JOHNSON

E 14

Scott Specialty Gases, Inc.

WHC-SD-WM-VI-032
Revision 0

Shipped from: 2600 CAJON BLVD.
SAN BERNARDINO CA 92411
Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ANALYSIS

ENTROPY
SON BUI
5932 BOLSA AVE
SUITE 105
HUNTINGTON BEACH CA 92649

PROJECT #: 02-30215-002
PO#: 8429
ITEM #: 02021452 2AL
DATE: 2/21/94

CYLINDER #: ALM012576
FILL PRESSURE: 2000PSIG
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +-2%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON MONOXIDE	60.	PPM	60.0	PPM
NITROGEN		BAL		BAL

2000PSIG BIN#1 02-25-94
NIST CRM1679

ALYTICAL METHOD: NDIR

NIST TRACEABILITY: CRM 1679

ANALYST: F.V.
FRANK V

E 15

PLUMSTEADVILLE, PENNSYLVANIA / TROY, MICHIGAN / HOUSTON, TEXAS / DURHAM, NORTH CAROLINA
SOUTH PLAINFIELD, NEW JERSEY / FREMONT, CALIFORNIA / WAKEFIELD, MASSACHUSETTS / LONGMONT, COLORADO
BATON ROUGE, LOUISIANA

Scott Specialty Gases, Inc.

3/9/94 WHC-SD-WM-VI-032
Revision 0

Shipped From: 2600 CAJON BLVD.
SAN BERNARDINO CA 92411
Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ANALYSIS

ENTROPY
SON BUI
5932 BOLSA AVE
SUITE 105
HUNTINGTON BEACH CA 92649

PROJECT #: 02-30215-003
PO#: 8429
ITEM #: 02021452 2AL
DATE: 2/21/94

CYLINDER #: ALM005676
FILL PRESSURE: 2000PSIG
BLEND TYPE : ACUBLEND MASTER GAS

ANALYTICAL ACCURACY: +-2%

COMPONENT	REQUESTED GAS CONC MOLES		ANALYSIS (MOLES)	
CARBON MONOXIDE	90.	PPM	90.0	PPM
NITROGEN		BAL		BAL

2000PSIG BIN#1 02-25-94
NIST CRM1679

ANALYTICAL METHOD: NDIR

NIST TRACEABILITY: CRM1679

ANALYST: F.V.
FRANK V

E 16

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

ENTE02

TO:

SON BUI
ENTROPY ENVIRONMENTALISTS INC
5932 BOLSA AVE STE 105
HUNTINGTON BCH, CA 92649-

DATE : 06/30/93

CUSTOMER ORDER NUMBER: 2232

PAGE 1

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	CC122028					
Nitric Oxide	177.7 ± 1.8 ppm	GMIS	Monitor Labs Model 8440		06/23/93	06/30/93
NOX	177.7 PPM	Cylinder #	S/N 136	06/30/95	177.6 ppm	177.6 ppm
Nitrogen,O2-Free Balance		CC28789	Continuous		177.9 ppm	177.6 ppm
Cylinder Pressure: 2000 psig		@ 249.2 ppm	Chemiluminescence		177.7 ppm	178.0 ppm
			Last Cal Date: 06/22/93	Mean:	177.7 ppm	177.7 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: _____ B.E. Gross

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.

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENTROPY
WAYNE JOHNSON
5932 BOLSA AVE
SUITE 105
HUNTINGTON BEACH, CA 92649

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order WAYNE
Project # 29396.005

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1 , Section Number 3.0.4

Cylinder Number ALM017512 **Certification Date** 01-18-94 **Exp. Date** 01-18-96
Cylinder Pressure 1950 psig

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
SULFUR DIOXIDE	499.1 PPM	± 1 % NIST Traceable

Balance Gas: Nitrogen

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
GMIS	08-95	ALM004301	952.5 ppm

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Horiba / OPE-135D / 56463601	10-04-93	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Sulfur Dioxide

First Triad Analysis

Date: 01-11-94 Response Units: mv
Z1= 0.00 R1= 92.3 T1= 55.7
R2= 92.3 Z2= 0.00 T2= 55.7
Z3= 0.00 T3= 55.7 R3= 92.3
Avg. Conc. of Cust Cyl. 499.1 ppm

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Second Triad Analysis

Date: 01-18-94 Response Units: mv
Z1= 0.00 R1= 92.3 T1= 55.7
R2= 92.3 Z2= 0.00 T2= 55.7
Z3= 0.00 T3= 55.7 R3= 92.3
Avg. Conc. of Cust Cyl. 499.1 ppm

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Date: Response Units: mv
Z1= R1= T1=
R2= Z2= T2=
Z3= T3= R3=
Avg. Conc. of Cust Cyl.

Calibration Curve

Concentration= Ax^3+Bx^2+Cx+D
A =0.0001206
B =0.01834
C =7.570
D =-0.2528

Concentration=

Concentration=

SPECIAL NOTES:IF THIS PRODUCT IS USED FOR ACID RAIN COMPLIANCE, THE ACID RAIN EXPIRATION DATE NOTED ABOVE APPLIES PER 40 CFT PART 73,APPENDIX II. OTHERWISE THE GENERAL EXPIRATION DATE APPLIES.

ANALYST

Scott Specialty Gases, Inc.

2600 CAJON BOULEVARD, SAN BERNARDINO, CA 92411 (909) 887-2571 FAX: (909) 887-0549

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
ENTROPY
5932 BOLSA AVE
SUITE105
HUNTINGTON BEACH, CA 92649

Assay Laboratory
Scott Specialty Gases
2600 Cajon Boulevard
San Bernardino, CA 92411

Purchase Order 8813
Project # 30957.003

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay and Certification of Gaseous Calibration Standards; Procedure G1; September 1993.

Cylinder Number ALM036845 **Certification Date** 04-26-94 **Exp. Date** 04-26-97

Cylinder Pressure+ 1950 PSIG

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
SULFUR DIOXIDE	847.9 PPM	± 1 % NIST Traceable
(Nitrogen)	Balance Gas	

+Do not use when cylinder pressure is below 150 psig.
*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type/Sample No.	Expiration Date	Cylinder Number	Concentration
GMIS	06-94	ALM004301	938.2 ppm SO2/N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
SO2:Horiba / OPE-135D / 56463601	04-13-94	NDIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Sulfur Dioxide	Date: 04-18-94 Response Units: mv Z1= 0.00 R1= 93.8 T1= 87.0 R2= 93.8 Z2= 0.00 T2= 87.0 Z3= 0.00 T3= 87.0 R3= 93.8 Avg. Conc. of Cust Cyl. 847.9 ppm	Date: 04-26-94 Response Units: mv Z1= 0.00 R1= 93.8 T1= 87.0 R2= 93.8 Z2= 0.00 T2= 87.0 Z3= 0.00 T3= 87.0 R3= 93.8 Avg. Conc. of Cust Cyl. 847.9 ppm	Concentration= Ax^3+Bx^2+Cx+D A =0.0001094 B =0.01757 C =7.388 D =-0.07436
	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units: mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=
	Date: Response Units:mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Date: Response Units:mv Z1= R1= T1= R2= Z2= T2= Z3= T3= R3= Avg. Conc. of Cust Cyl.	Concentration=

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Special Notes:

Appendix F
SO_2 and NO_x Analyzer Performance Tests

INTERFERENCE RESPONSE

Analyzer Type WESTERN RESEARCH #3 SO_2 Span 100 ppm

Serial Number 90-721 AT2-7702-1 Date of Test July 14, 1993

GAS TYPE	CONCENTRATION	ANALYZER RESPONSE PPM SO_2	% OF SPAN [1]
CO/N_2	683.9 ppm	-0.1	0.1
NO/N_2	244 ppm	-0.1	0.1
CO_2/N_2	10.85%	0.0	0.0
O_2/N_2	21.4%	-0.3	0.3
		TOTALS	0.5 [2]

[1] % SPAN = $\frac{\text{ANALYZER RESPONSE}}{\text{INSTRUMENT SPAN}} \times 100$

[2] SPECIFICATION (EPA METHOD 20): SUM OF INTERFERENCE RESPONSES MUST NOT EXCEED 2% OF SPAN.

INTERFERENCE TEST PROCEDURES

ENTROPY followed the manufacturer's recommended set-up procedures contained in the analyzer manual. After the initial set-up procedures were completed, the electronics of the monitor were adjusted according to the manufacturer's guidelines. The monitor was calibrated by flowing SO_2 calibration gases into the instrument. The NO, CO, CO_2, and O_2 calibration gases listed above were injected into the monitor and the responses were recorded on a strip chart, which was analyzed to determine if the gases caused interference (ie, deviations from a zero reading) in the SO_2 monitor.

TIME	WR #3 ppmSO2
13:51	0.1
13:52	0.1
13:53	0.1
13:54	0.1
13:55	0.1
13:56	-0.0
13:57	-0.1
13:58	0.1
13:59	-0.1
14:00	-0.1
14:01	-0.2
14:02	-0.1
14:03	-0.1
14:04	-0.1
14:05	-0.2
14:06	-0.3
14:07	-0.3
14:08	-0.3
14:09	-0.3
14:10	-0.2
14:11	-0.4
14:12	-0.3
14:13	-0.4
14:14	-0.4

Zero

CO_2 10.85% CO_2

NO_x 244 NO/245 NO_x

CO 683.9 ppm CO

O_2 21.4% O_2

Zero

INTERFERENCE RESPONSE

Analyzer Type THERMO ENVIRONMENTAL EEI #2 Span 100

Serial Number 10AR 20667 192 Date of Test July 14 1992

GAS TYPE	CONCENTRATION	ANALYZER RESPONSE PPM NO	% OF SPAN [1]
CO/N_2	683.9 ppm	0.1	0.1
SO_2/N_2	240 ppm	0.4	0.4
CO_2/N_2	11.06%	0.1	0.1
O_2/N_2	20.5 %	0.1	0.1
		TOTALS	0.7 [2]

[1] % SPAN = $\frac{\text{ANALYZER RESPONSE}}{\text{INSTRUMENT SPAN}} \times 100$

[2] SPECIFICATION (EPA METHOD 20): SUM OF INTERFERENCE RESPONSES MUST NOT EXCEED 2% OF SPAN.

INTERFERENCE TEST PROCEDURES

ENTROPY followed the manufacturer's recommended set-up procedures contained in the analyzer manual. After the initial set-up procedures were completed, the electronics of the monitor were adjusted according to the manufacturer's guidelines. The monitor was calibrated by flowing NO calibration gases into the instrument. The SO_2, CO, CO_2, and O_2 calibration gases listed above were injected into the monitor and the responses were recorded on a strip chart, which was analyzed to determine if the gases caused interference (ie, deviations from a zero reading) in the NOx monitor.

Date: 2/13/95

Entropy External Moly Converter Effeciency Test

Reference Gas Value: 94.9 ppm NO2

Time	NOx (ppm)	Converter Effeciency	Mean Deviation
2218	90.4	95.3	-0.12
2219	90.4	95.3	-0.12
2220	90.4	95.3	-0.12
2221	90.5	95.4	-0.01
2222	90.5	95.4	-0.01
2223	90.6	95.5	0.10
2224	90.6	95.5	0.10
2225	90.6	95.5	0.10
2226	90.6	95.5	0.10
Average:	90.5	95.4	0.0

Mean Deviation Calc = ((NOx (ppm) - Run Average)/Run Average) * 100
{Mean Deviation < 5%}

Converter Effeciency Calc = (NOx (ppm)/Reference Gas Value)*100
{Average Converter Efficiency > 90%}

CALIBRATION SUMMARY

SOURCE: NOX CONVERTER EFFECIENCY TEST

REASON: INITIAL DIRECT CALIBRATION FOR MOLY CONVERTER

DATE : 02-13-1995 TIME: 21:26 - 21:30

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
14	TECO1	ppmNOx	0.0	0.3
14	TECO1	ppmNOx	85.0	85.2
14	TECO1	ppmNOx	181.4	181.2

NOX CONVERTER EFFECIENCY TEST FOR MOLY CONVERTER 02-13-1995

TIME	CHAN14 TECO1 ppmNOx
22:18	90.4
22:19	90.4
22:20	90.4
22:21	90.5
22:22	90.5
22:23	90.6
22:24	90.6
22:25	90.6
22:26	90.6

COMMENTS: END TEST RUN

ENTROPY

CALIBRATION SUMMARY

SOURCE: NOX CONVERTER EFFECIENCY TEST FOR MOLY CONVERTER

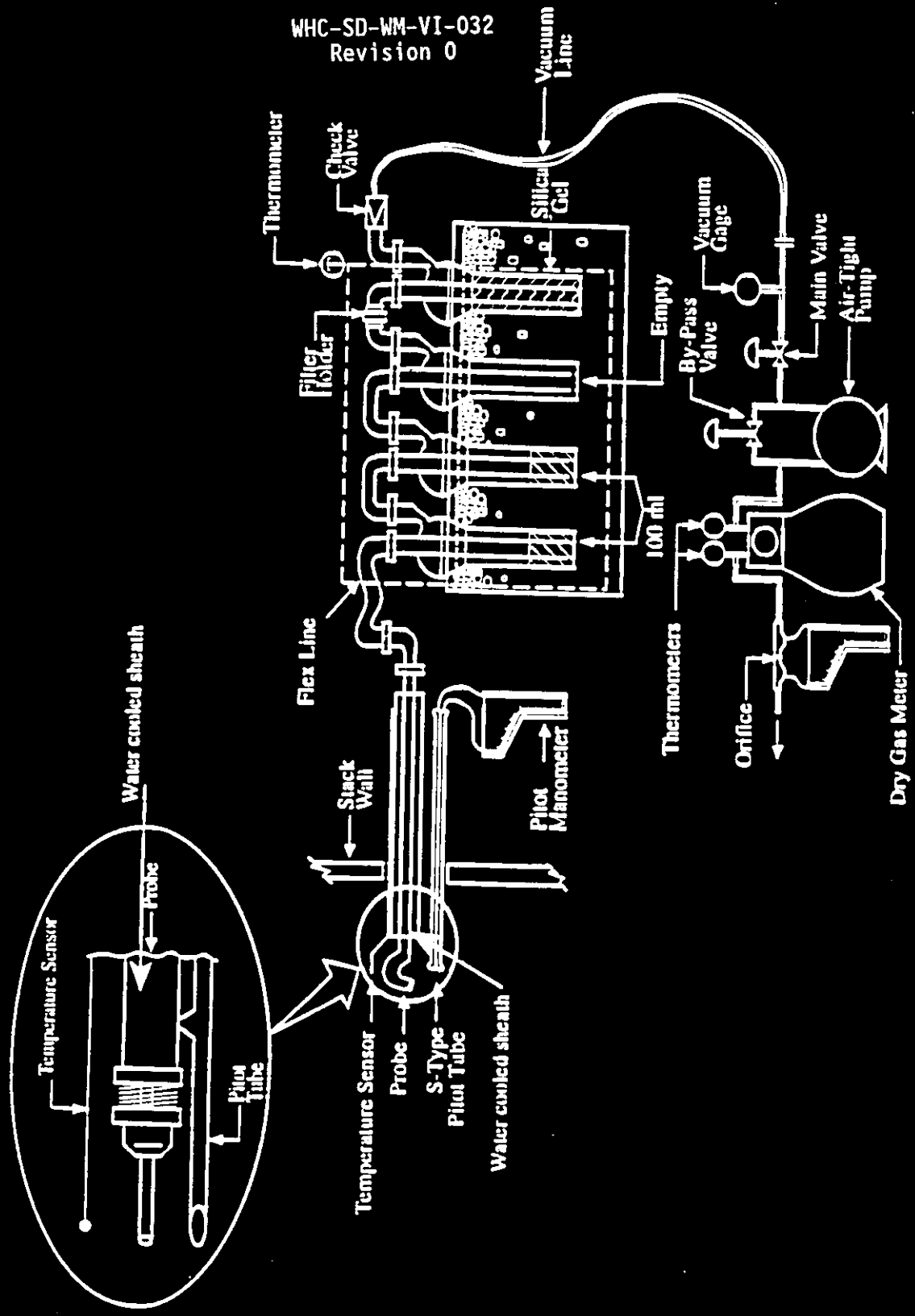
REASON: POST CALIBRATION ERROR FOR MOLY CONVERTER

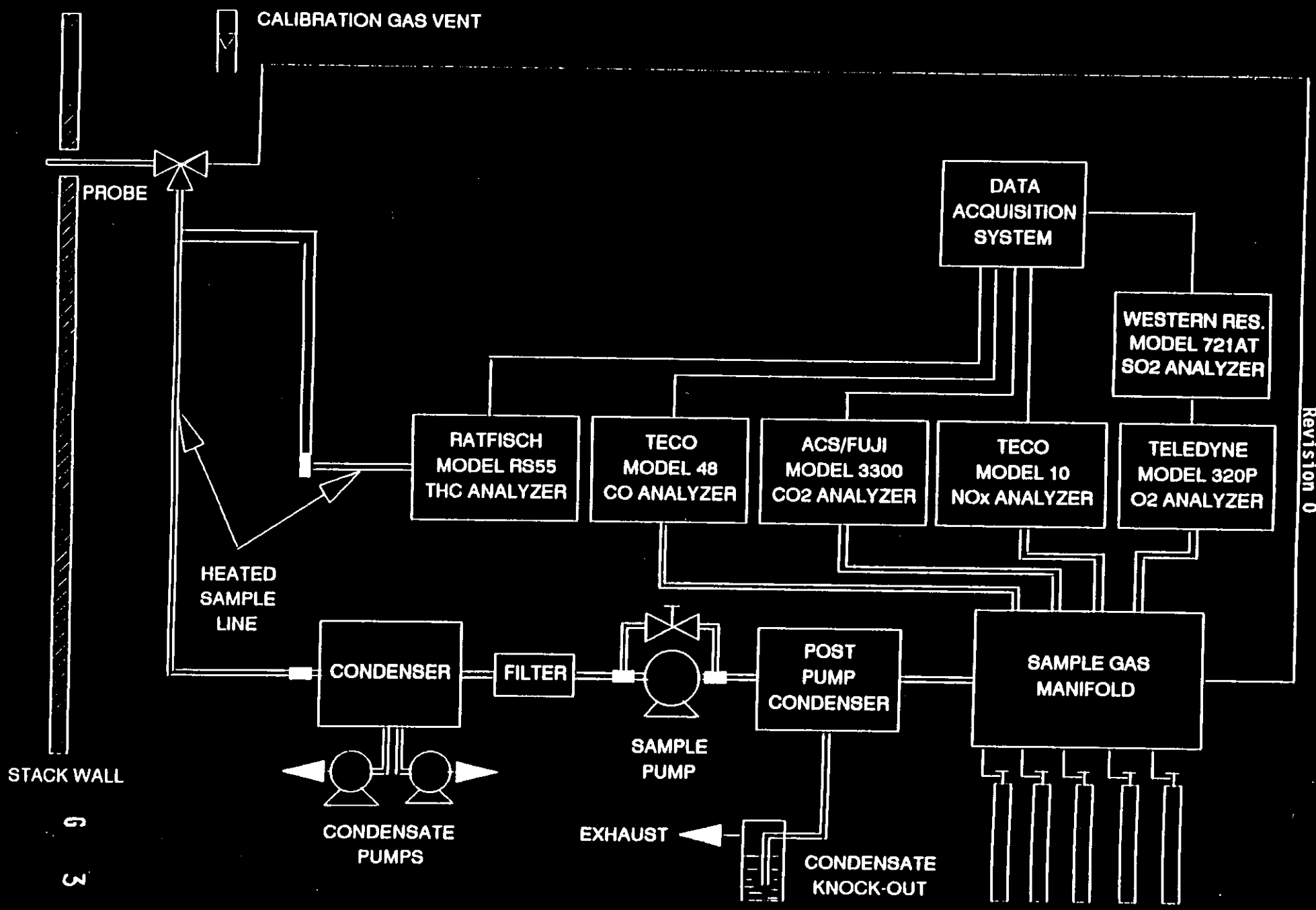
DATE : 02-13-1995 TIME: 22:28 - 22:32

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
14	TECO1	ppmNOx	0.0	0.3
14	TECO1	ppmNOx	181.4	181.2

ENTROPY

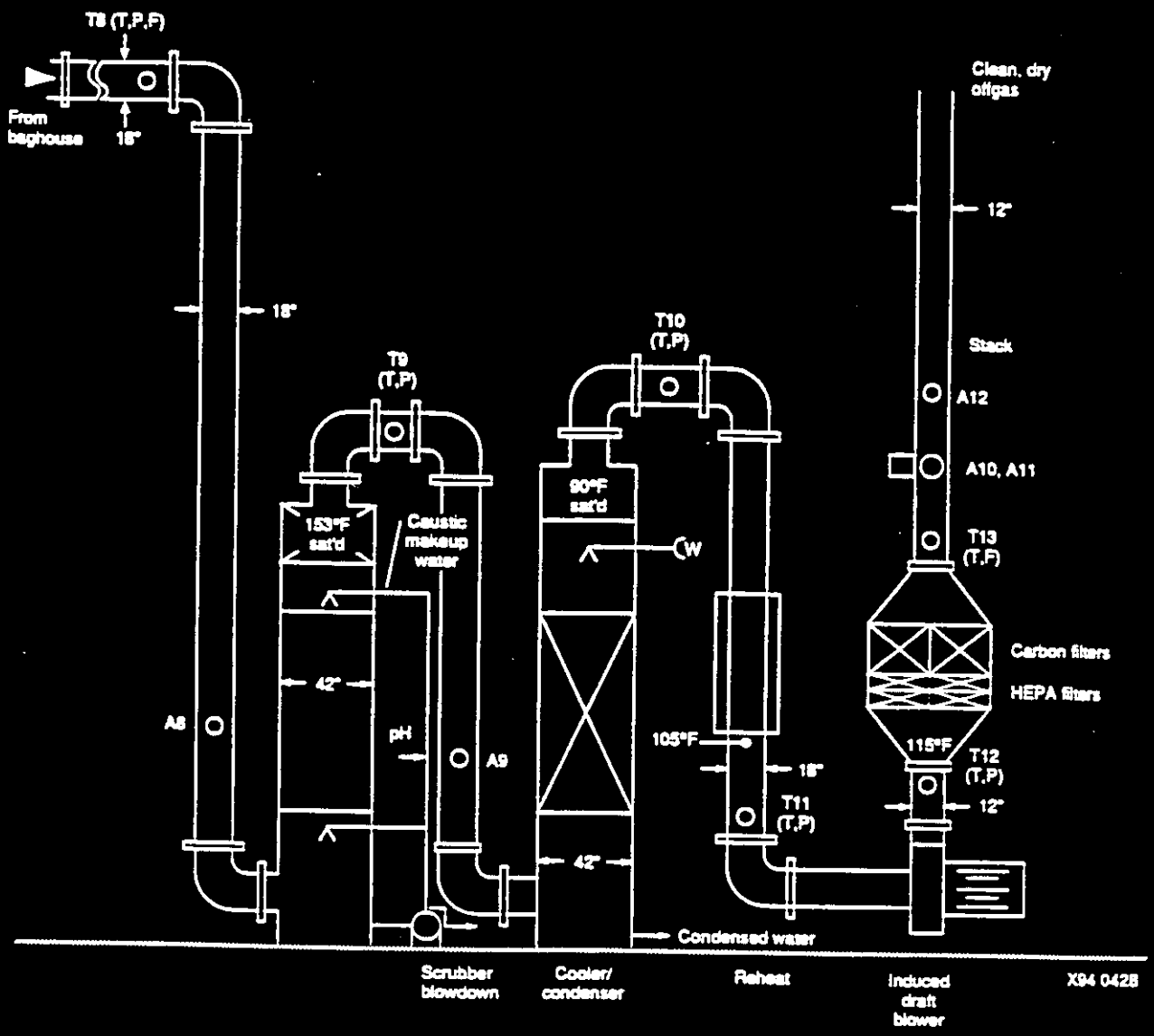
Appendix G
Sampling Train Schematics


Vacuum Line
Thermometer
Check Valve
Silica Gel
Vacuum Gage
Main Valve
Air-Tight Pump
Empty
By-Pass Valve
Filter Holder
100 ml
Flex Line
Thermometers
Orifice
Dry Gas Meter
Stack Wall
Pitot Manometer
Water cooled sheath
Probe
Temperature Sensor
Pitot Tube
Temperature Sensor
Probe
S-Type Pitot Tube
Water cooled sheath



ENTROPY MOBILE CEM SYSTEM SCHEMATIC

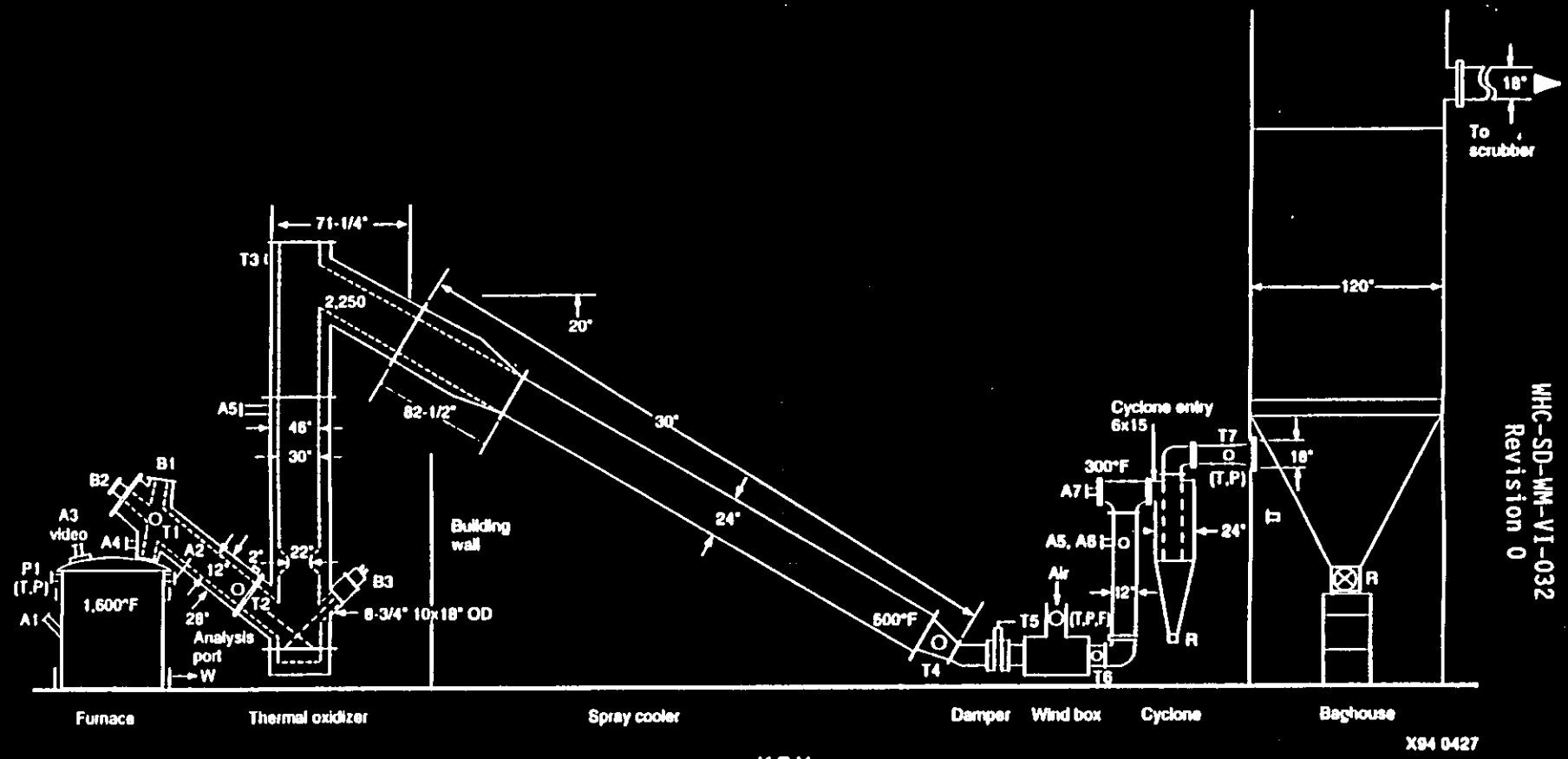
Appendix H
Process Schematics



KEY

T - Temperature probe
P - Pressure probe
A - Analysis port
F - Flowrate probe (offgas)
W - Cooling water flowrate
CW - Cooling water

Schematic of the offgas system downstream of the baghouse.



KEY

B - Natural gas burner

P,T - Temperature, pressure port

A - Analysis port

F - Flowrate probe (offgas)

W - Flowrate probe (water)

R - Rotary air lock valve

------- Indicates refractory lining

Schematic of the offgas system from the furnace to the baghouse.

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