Report of...

Compliance Emission Sampling

Performed for...

EJ USA, INC.
East Jordan, Michigan

On...

Various Sources

September 13-28, 2016

Project #: 058.12

By...

Network Environmental, Inc.
Grand Rapids, MI

I. INTRODUCTION

Network Environmental, Inc. was retained by EJ USA, Inc. of East Jordan, Michigan, to conduct an emission study at their facility. The purpose of the study was to meet the emission testing requirements of Renewable Operating Permit (ROP) No. MI-ROP-A0767-2015 and the NESHAPS for Iron and Steel Foundries, 40 CFR Part 63 (MACT). The following is a list of the sources sampled, the compounds sampled for and the associated emission limits:

Emission Unit/Source	Compound (s) Sampled	Emission Limit
EUMELT-OPERATIONS Harsell Baghouse (SV140-DC)	Particulate Matter (PM)	36.6 Lbs/Hr, 0.60 Lbs/Ton of Charge & 129 Tons/Year; **MACT:** 0.006 Grains/DSCF or 0.10 Lbs/Ton of Charge
	Carbon Monoxide (CO)	332 Lbs/Hr & 1,175 Tons/Year
	Volatile Organic (VO) HAP's	**MACT:** 20 PPMV @ 10% O_2
EUTACCONE-MOLD (SV016-DC, SV020-DC, SV021-DC, SV022-DC, SV023-DC, SV024-DC, SV161-DC, SV162-DC & SV163-DC)	Particulate Matter (PM)	0.05 Lbs/1000 Lbs of Exhaust Gas, 47.3 Lbs/Hr & 147.4 Tons/Year
EUTACCONE-MOLD Sand Cooling System (SV017-DC)	Particulate Matter (PM)	0.018 Lbs/1000 Lbs of Exhaust Gas
FGFINISHING (SV018-DC & SV141-DC)	Particulate Matter (PM)	0.037 Lbs/1000 Lbs of Exhaust Gas
FG-LML (SV082-DC & SV083-DC)	PM-10	0.0045 Grains/DSCF & 27.46 Tons/Year
Taccone Mold Pouring Inlet & LML Pouring Inlet (Baghouse Inlets)	Particulate Matter (PM)	**MACT:** 0.01 Grains/DSCF
EUWHEELABRATOR (SV019-DC & SV165-DC)	Particulate Matter (PM)	0.10 Lbs/1000 Lbs of Exhaust Gas
Unless identified, all the above limits are ROP limits.		

The following reference test methods were employed to conduct the emission sampling:

- Particulate (All Sources Except Listed As Follows) – U.S. EPA Method 17
- Particulate (Taccone & LML Baghouse Inlets Only) – U.S. EPA Method 5
- Particulate (Harsell Baghouse Only) – U.S. EPA Method 5D
- PM-10 (LML Only) – U.S. EPA Methods 17 & 202
- Carbon Monoxide (CO) – U.S. EPA Method 10
- Volatile Organic (VO) HAP's – U.S. EPA Method 25A
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Methods 1 - 4.

The sampling was performed over the period of September 13-28, 2016 by Stephan K. Byrd, R. Scott Cargill, Richard D. Eerdmans, and David D. Engelhardt of Network Environmental, Inc.. Assisting with the study were Mr. Tony Pitts and Mr. Chris Rodgers of EJ USA, Inc. along with the operating staff of the facility. Mr. Jeremy Howe and Mr. William Rogers, Jr. of the Michigan Department of Environmental Quality (MDEQ) – Air Quality Division were present to observe portions of the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
PARTICULATE EMISSION RESULTS
HARSELL BAGHOUSE (EUMELT-OPERATIONS)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration Grains/DSCF (2)	Particulate Mass Rates	
						Lbs/Hr (3)	Lbs/Ton of Charge (4)
SV140-DC Harsell Baghouse	1	9/20/16	10:18-13:11	69,329	0.00117	0.65	0.0131
	2	9/20/16	14:35-16:28	65,039	0.00062	0.32	0.0072
	3	9/20/16	17:13-18:59	69,736	0.00099	0.56	0.0137
	Average			**68,035**	**0.00093**	**0.51**	**0.0113**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg). The air flows used for the mass rate calculations were measured at the baghouse inlet.
(2) Grains/DSCF = Grains of Particulate per Dry Standard Cubic Foot of Exhaust Gas
(3) Lbs/Hr = Pounds of Particulate Per Hour
(4) Lbs/Ton of Charge = Lbs of Particulate per Ton of Metal Charged. Calculated using charge rates of 49.67 Tons/Hr for sample 1, 44.25 Tons/Hr for sample 2 and 40.89 Tons/Hr for sample three (as supplied by EJ).

II.2 TABLE 2
VO HAP EMISSION RESULTS
HARSELL BAGHOUSE (EUMELT-OPERATIONS)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	VO HAP Concentration PPM @ 10% O_2 (2)	VO HAP Mass Rate Lbs/Hr (3)
SV140-DC Harsell Baghouse	1	9/20/16	10:21-11:51	69,329	0.25	0.19
	2	9/20/16	14:36-15:36	65,039	0.44	0.26
	3	9/20/16	17:15-18:15	69,736	0.50	0.28
	Average			**68,035**	**0.40**	**0.24**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg). The air flows used for the mass rate calculations were measured at the baghouse inlet.
(2) PPM @10% O_2 = Parts Per Million (v/v) On a Actual (Wet) Basis As Hexane Corrected to 10% Oxygen
(3) Lbs/Hr = Pounds of VO HAP Per Hour As Hexane

II.3 TABLE 3
CARBON MONOXIDE (CO) EMISSION RESULTS
HARSELL BAGHOUSE (EUMELT-OPERATIONS)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	CO Concentration PPM (2)	CO Mass Rate Lbs/Hr (3)
SV140-DC Harsell Baghouse	1	9/20/16	10:21-11:51	64,809	6.1	1.72
	2	9/20/16	14:36-15:36	60,896	5.7	1.51
	3	9/20/16	17:15-18:15	65,371	5.1	1.45
	Average			**63,692**	**5.6**	**1.56**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg). The air flows used for the mass rate calculations were measured at the baghouse inlet.
(2) PPM = Parts Per Million (v/v) On a Dry Basis
(3) Lbs/Hr = Pounds of Carbon Monoxide Per Hour

II.4 TABLE 4 (PAGE 1 OF 3)
PARTICULATE EMISSION RESULTS
TACCONE MOLD LINE (EUTACCONE-MOLD)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration Lbs/1000 Lbs, Dry (2)	Particulate Mass Rate Lbs/Hr (3)
SV161-DC Phase III	1	9/22/16	09:56-11:08	76,871	0.0016	0.53
	2	9/22/16	11:38-12:49	77,275	0.0033	1.12
	3	9/22/16	13:13-14:23	77,777	0.0029	0.97
	Average			**77,308**	**0.0026**	**0.87**
SV162-DC Phase III	1	9/22/16	09:56-11:08	69,832	0.0013	0.38
	2	9/22/16	11:38-12:49	69,591	0.0012	0.36
	3	9/22/16	13:13-14:23	68,649	0.0016	0.47
	Average			**69,358**	**0.0013**	**0.40**
SV163-DC Phase III	1	9/22/16	09:56-11:08	74,641	0.0014	0.45
	2	9/22/16	11:38-12:49	73,906	0.0017	0.55
	3	9/22/16	13:13-14:23	73,878	0.0015	0.47
	Average			**74,142**	**0.0015**	**0.49**
SV020-DC Sand System	1	9/13/16	10:26-11:28	54,815	0.0016	0.38
	2	9/13/16	12:16-13:19	55,228	0.0013	0.31
	3	9/13/16	13:46-14:48	55,868	0.0017	0.40
	Average			**55,304**	**0.0015**	**0.37**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
(3) Lbs/Hr = Pounds of Particulate Per Hour

II.4 TABLE 4 (PAGE 2 OF 3)
PARTICULATE EMISSION RESULTS
TACCONE MOLD LINE (EUTACCONE-MOLD)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration Lbs/1000 Lbs, Dry (2)	Particulate Mass Rate Lbs/Hr (3)
SV021-DC P/S	1	9/27/16	10:03-11:23	56,610	0.00092	0.23
	2	9/27/16	12:06-13:26	57,175	0.00091	0.23
	3	9/27/16	14:15-15:35	57,814	0.00095	0.24
	Average			**57,200**	**0.00093**	**0.23**
SV022-DC P/S	1	9/27/16	10:02-11:22	59,278	0.0009	0.24
	2	9/27/16	12:05-13:25	60,242	0.0035	0.92
	3	9/27/16	14:14-15:34	57,849	0.0024	0.62
	Average			**59,123**	**0.0023**	**0.59**
SV023-DC P/S	1	9/27/16	10:02-11:22	64,302	0.0090	2.54
	2	9/27/16	12:05-13:25	66,171	0.0069	2.00
	3	9/27/16	14:14-15:34	61,011	0.0099	2.58
	Average			**63,828**	**0.0086**	**2.37**
SV024-DC P/S	1	9/27/16	10:02-11:22	61,926	0.0054	1.46
	2	9/27/16	12:05-13:25	62,419	0.0048	1.31
	3	9/27/16	14:14-15:34	58,035	0.0065	1.61
	Average			**60,793**	**0.0055**	**1.46**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
(3) Lbs/Hr = Pounds of Particulate Per Hour

II.4 TABLE 4 (PAGE 3 OF 3)
PARTICULATE EMISSION RESULTS
TACCONE MOLD LINE (EUTACCONE-MOLD)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration Lbs/1000 Lbs, Dry (2)	Particulate Mass Rate Lbs/Hr (3)
SV016-DC Sand System	1	9/13/16	10:32-11:38	52,539	0.00045	0.10
	2	9/13/16	12:00-13:06	52,161	0.00046	0.10
	3	9/13/16	13:27-14:35	52,283	0.00103	0.23
	Average			**52,328**	**0.00065**	**0.15**
SV017-DC Sand Cooling System	1	9/14/16	09:10-10:15	44,247	0.0027	0.51
	2	9/14/16	10:47-11:51	43,896	0.0029	0.54
	3	9/14/16	12:37-13:40	43,572	0.0029	0.53
	Average			**43,905**	**0.0028**	**0.53**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
(3) Lbs/Hr = Pounds of Particulate Per Hour

II.5 TABLE 5
PARTICULATE EMISSION RESULTS
FINISHING (FGFINISHING)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration Lbs/1000 Lbs, Dry (2)	Particulate Mass Rate Lbs/Hr (3)
SV018-DC Grinding	1	9/14/16	14:43-15:49	105,693	0.00036	0.17
	2	9/14/16	16:09-17:14	106,964	0.00021	0.10
	3	9/14/16	17:23-18:27	107,411	0.00021	0.10
	Average			**106,689**	**0.00026**	**0.12**
SV141-DC Shot Blast	1	9/14/16	09:20-10:26	74,387	0.00034	0.11
	2	9/14/16	10:40-11:45	73,806	0.00052	0.17
	3	9/14/16	12:09-13:13	72,830	0.00017	0.06
	Average			**73,674**	**0.00034**	**0.11**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
(3) Lbs/Hr = Pounds of Particulate Per Hour

II.6 TABLE 6
PM-10 (1) EMISSION RESULTS
LML(FG-LML)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (2)	Particulate Concentration Grains/DSCF (3)	Particulate Mass Rate Lbs/Hr (4)
SV082-DC (North)	1	9/21/16	10:45-11:48	75,697	0.0034	2.16
	2	9/21/16	12:20-13:23	75,979	0.0036	2.27
	3	9/21/16	13:49-14:51	75,161	0.0034	2.12
	Average			**75,612**	**0.0034**	**2.18**
SV083-DC (South)	1	9/21/16	10:45-11:48	65,340	0.0037	2.04
	2	9/21/16	12:20-13:23	64,563	0.0037	2.01
	3	9/21/16	13:49-14:51	63,678	0.0035	1.87
	Average			**64,527**	**0.0037**	**1.97**

(1) PM-10 = Total Particulate (Front Half Filterable & Back Half Condensable)
(2) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(3) Grains/DSCF = Grains of Particulate Per Dry Standard Cubic Foot Of Exhaust Gas
(4) Lbs/Hr = Pounds of Particulate Per Hour

II.7 TABLE 7
PARTICULATE EMISSION RESULTS
TACCONE (EUTACCONE-MOLD) & LML (FG-LML) INLETS
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration		Particulate Mass Rate Lbs/Hr (4)
					Lbs/1000 Lbs, Dry (2)	Grains/DSCF (3)	
Taccone Inlet	1	9/28/16	09:49-11:12	19,485	0.0146	0.0076	1.25
	2	9/28/16	11:50-13:10	19,361	0.0143	0.0075	1.22
	3	9/28/16	14:23-15:43	19,754	0.0125	0.0065	1.09
	Average			**19,534**	**0.0138**	**0.0072**	**1.19**
LML Pouring Inlet	1	9/28/16	10:47-12:21	28,405	0.0026	0.0014	0.33
	2	9/28/16	12:40-14:28	28,081	0.0031	0.0016	0.38
	3	9/28/16	14:46-16:08	27,976	0.0046	0.0024	0.57
	Average			**28,154**	**0.0034**	**0.0018**	**0.43**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
(3) Grains/DSCF = Grains of Particulate Per Dry Standard Cubic Foot of Exhaust Gas
(4) Lbs/Hr = Pounds of Particulate Per Hour

II.8 TABLE 8
PARTICULATE EMISSION RESULTS
WHEELABRATOR (EUWHEELABRATOR)
EJ USA, INC.
EAST JORDAN, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	Particulate Concentration Lbs/1000 Lbs, Dry (2)	Particulate Mass Rate Lbs/Hr (3)
SV019-DC Wheelabrator	1	9/15/16	08:33-09:48	43,775	0.0020	0.39
	2	9/15/16	10:23-11:26	42,688	0.0025	0.46
	3	9/15/16	11:54-12:58	42,944	0.0035	0.67
	Average			**43,136**	**0.0027**	**0.50**
SV165-DC Wheelabrator Addition	1	9/15/16	08:46-09:50	17,867	0.0031	0.25
	2	9/15/16	10:03-11:18	17,583	0.0037	0.29
	3	9/15/16	11:34-12:37	17,412	0.0049	0.38
	Average			**17,621**	**0.0039**	**0.30**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
(3) Lbs/Hr = Pounds of Particulate Per Hour

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Tables 1 through 8 (Sections II.1 through II.8). The results are presented as follows:

III.1 Harsell Baghouse (SV140-DC) Particulate Emission Results (Table 1)

Table 1 summarizes the particulate emission results for the Harsell Baghouse as follows:

- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Grains/DSCF) – Grains of Particulate Per Dry Standard Cubic Foot of Exhaust Gas
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour
- Particulate Mass Emission Rate (Lbs/Ton of Charge) – Pounds of Particulate Per Ton of Metal Charged

Table 1 summarizes the combined particulate emission results for both sides (North & South) of the Harsell Baghouse. A more detailed breakdown of each individual particulate sample from each side can be found in Appendix A. Example calculations, which detail how the data in Table 1 was calculated from the North and South side results, can be found in Appendix F. The air flow rates used for the mass rate calculations were measured at the baghouse inlet.

III.2 Harsell Baghouse (SV140-DC) VO HAP's Emission Results (Table 2)

Table 2 summarizes the VO HAP's emission results for the Harsell Baghouse as follows:

- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- VO HAP's Concentration (PPM @ 10% O_2) – Parts Per Million (v/v) On A Actual (Wet) Basis As Hexane Corrected To 10% Oxygen
- VO HAP's Mass Emission Rate (Lbs/Hr) – Pounds of VO HAP's Per Hour As Hexane

The HAP's concentrations were measured in the inlet duct to the Harsell Baghouse. The air flow rates used for the mass rate calculations were also measured at the baghouse inlet.

III.3 Harsell Baghouse (SV140-DC) Carbon Monoxide (CO) Emissions (Table 3)

Table 3 summarizes the CO emission results for the Harsell Baghouse as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- CO Concentration (PPM) – Parts Per Million (v/v) on a Dry Basis
- CO Mass Emission Rate (Lbs/Hr) – Pounds of CO Per Hour

The CO concentrations were measured in the inlet duct to the Harsell Baghouse. The air flow rates used for the mass rate calculations were also measured at the baghouse inlet.

III.4 TACCONE Mold Line Particulate Emissions (Table 4)

Table 4 summarizes the particulate emission results for the TACCONE Mold Line (SV020-DC, SV021-DC, SV022-DC, SV023-DC, SV024-DC, SV161-DC, SV162-DC, SV163-DC, SV016-DC & SV017DC) as follows:

- Source
- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Lbs/1000 Lbs, Dry) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

SV021-DC, SV022-DC, SV023-DC and SV024-DC were sampled simultaneously with each other. SV161-DC, SV162-DC and SV163-DC were sampled simultaneously with each other.

III.5 FINISHING (SV018-DC & SV141-DC) Particulate Emissions (Table 5)

Table 5 summarizes the particulate emission results for FINISHING (SV018-DC & SV141-DC) as follows:

- Source
- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)

- Particulate Concentration (Lbs/1000 Lbs, Dry) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

III.6 LML (SV082-DC & SV083-DC) PM-10 Emissions (Table 6)

Table 6 summarizes the PM-10 emission results for the LML (SV082-DC & SV083-DC) as follows:

- Source
- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Grains/DSCF) – Grains of Particulate Per Dry Standard Cubic Foot of Exhaust Gas
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

The PM-10 consists of the total filterable (front half) and condensable (back half) particulate. Also, it should be noted that SV082-DC and SV083-DC were sampled simultaneously.

III.7 TACCONE & LML Pouring Inlets Particulate Emissions (Table 7)

Table 7 summarizes the particulate emission results for the Taccone and LML pouring inlets as follows:

- Source
- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Lbs/1000 Lbs, Dry) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas
- Particulate Concentration (Grains/DSCF) – Grains of Particulate Per Dry Standard Cubic Foot of Exhaust Gas
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

III.8 WHEELABRATOR (SV019-DC & SV165-DC) Particulate Emissions (Table 8)

Table 8 summarizes the particulate emission results for WHEELABRATOR (SV019-DC & SV165-DC) as follows:

- Source

- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Lbs/1000 Lbs, Dry) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

IV. SOURCE DESCRIPTION

IV.1 EUMELT-Operations – This unit includes the cupola and the holding furnace. The cupola is permitted to charge 431,868 tons per year based on a 12-month rolling average. The emissions from the melt operation are controlled by afterburners and a positive pressure Harsell Baghouse (SV140-DC). The baghouse is comprised of twelve (12) compartments.

IV.2 TACCONE Mold Line – The Taccone mold line is a closed loop green sand mold line where molds are made and castings are poured. The emissions from the casting handling area, pour, cooling, shakeout and sand system are controlled by baghouses.

IV.3 FINISHING – The finishing group consists of the Ervin shot blasting, welding repair and grinding operations. The emissions from the finishing group is controlled by baghouses.

IV.4 LML – The LML (large mold line) is a green sand mold line where molds are made and castings are poured. The emissions from the LML are controlled by baghouses.

IV.5 WHEELABRATOR – A large capacity shot blast machine used to clean castings. The emissions from the wheelabrator are controlled by two baghouses.

Operating data for the sources during the testing can be found in Appendix B.

V. SAMPLING AND ANALYTICAL PROTOCOL

V.1 Particulate (All Sources Except The Harsell Baghouse & Inlets) – The particulate emission sampling was conducted in accordance with U.S. EPA Reference Method 17. Method 17 is an in-stack filtration method. Three (3) samples were collected from each of the sources sampled. Each sample was a minimum of sixty (60) minutes in duration, and had a minimum sample volume of thirty (30) dry standard cubic feet. The samples were collected isokinetically and analyzed for total particulate by gravimetric analysis. All the quality assurance and quality control procedures listed in the method were incorporated in the sampling and analysis. The particulate sampling train is shown in Figure 1.

V.2 Particulate (Harsell Baghouse Only) – The particulate emision sampling on the Harsell Baghouse was conducted in accordance with U.S. EPA Methods 5D & 17. Method 5D is a guideline for the determination of particulate matter from positive pressure fabric filters. It details the sampling locations and point selection for the particulate determination. Method 17 is the actual in-stack filtration method used to collect the samples.

Three (3) samples were collected from the Baghouse exhaust. Each sample consisted of two (2) separate Method 17 sampling train runs (one for each Baghouse side). The sampling on each Baghouse side was conducted simultaneously. The baghouse is divided into two (2) sides with six (6) compartments on each side (see diagram in Appendix G). There were two (2) sampling points for each baghouse compartment (12 points per side).

As per Method 5D, air flow rates were determined in the Baghouse inlet duct. The inlet flow data was used to calculate the velocity pressure at the Baghouse exhaust. A velocity pressure of 0.000086 inches of water (in. H_2O) was calculated for the Baghouse exhaust (see Appendix F). Because this velocity pressure was too low for isokinetic sampling, the sampling was conducted at a constant flow rate (approximately 0.75 CFM). Each sampling train run had a minimum sample volume of sixty (60) dry standard cubic feet and was ninety (90) minutes in duration. The results from both sides of the Harsell Baghouse were combined to determine the total emissions from the baghouse (see Appendix F). All the applicable quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis. The particulate sampling train is shown in Figure 1.

V.3 Particulate (TACCONE & LML Pouring Inlets) – The particulate emission sampling was conducted in accordance with U.S. EPA Reference Method 5. Method 5 is an out of stack filtration method where the filter is heated at 250 °F (plus or minus 25 °F). Three (3) samples were collected from

each of the sources sampled. Each sample was a minimum of sixty (60) minutes in duration, and had a minimum sample volume of sixty (60) dry standard cubic feet. The samples were collected isokinetically and analyzed for total particulate by gravimetric analysis. All the quality assurance and quality control procedures listed in the method were incorporated in the sampling and analysis. The Method 5 particulate sampling train is shown in Figure 2.

V.4 PM-10 (LML) – The PM-10 determinations were performed in accordance with U.S. EPA Methods 17 & 202. Method 17 is a in-stack filtration method. Three (3) samples, each sixty (60) minutes in duration, were collected from the exhausts. Each sample had a minimum sample volume of thirty (30) dry standard cubic feet. The sampling systems were operated isokinetically. Following each sample, a post-test nitrogen purge described in Method 202 was conducted on the back half (impingers).

The front and back half catches were recovered as per Methods 17 & 202. The front half (nozzle acetone rinse & filter) were measured gravimetrically. The back half was measured for condensables. The condensable fraction was determined by using the hexane extraction technique found in EPA Method 202 and separate gravimetric analysis of the hexane (organic) and water (inorganic) fractions. All the quality assurance requirements specified in the methods were incorporated in the sampling and analysis. Figure 3 is a diagram of the sampling train.

V.5 Volatile Organic (VO) HAP's – The VO HAP's emission sampling was conducted in accordance with U.S. EPA Reference Method 25A. A J.U.M. Model 3-500 flame ionization detector (FID) analyzer was used to monitor the source sampled. Sample gas was extracted through a heated probe. A heated teflon sample line was used to transport the exhaust gases to the analyzer. The analyzer produces instantaneous readouts of the VOC concentrations (PPM).

The analyzer was calibrated by system injection (from the back of the stack probe to the analyzer) prior to the testing. A span gas of 86.00 PPM was used to establish the initial instrument calibration. Calibration gases of 27.00 PPM and 51.20 PPM were used to determine the calibration error of the analyzer. After each sample, a system zero and system injection of 27.00 PPM were performed to establish system drift and system bias during the test period. All calibration gases used were Primary Standard Hexane Calibration Gases. Three (3) samples were collected from the Harsell Baghouse inlet. Each sample was sixty (60) minutes in duration.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the Harsell Baghouse inlet. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A diagram of the sampling train is shown in Figure 4.

V.6 Carbon Monoxide (CO) – The Carbon Monoxide (CO) emission sampling was conducted in accordance with U.S. EPA Reference Method 10. The sample gas was extracted from the source tested through a heated teflon sample line which led to a VIA MAK 2 sample gas conditioner and then to a Thermal Environmental Model 48C portable stack gas monitor. This analyzer is capable of giving instantaneous readouts of the CO concentrations (PPM). Three (3) samples were collected from the inlet to the Harsell Baghouse. Each sample was sixty (60) minutes in duration.

The analyzer was calibrated with EPA protocol CO calibration gases. A span gas of 985.3 PPM was used to establish the initial instrument calibration. Calibration gases of 492.5 PPM, 249.4 PPM and 92.97 PPM were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using the 249.4 PPM gas to determine the system bias. After each sample, a system zero and system injection of 249.4 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the Harsell Baghouse inlet. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A diagram of the sampling train is shown in Figure 5.

V.7 Oxygen & Carbon Dioxide (Harsell Baghouse Only) – The O_2 & CO_2 sampling was conducted in accordance with U.S. EPA Reference Method 3A. Servomex Model 1400M portable stack gas analyzers were used to monitor the inlet to the Harsell Baghouse. A heated teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzers. The analyzers produce instantaneous readouts of the O_2 & CO_2 concentrations (%). Three (3) samples were collected from the inlet to the Harsell Baghouse. Each sample was sixty (60) minutes in duration.

The analyzers were calibrated by direct injection prior to the testing. Span gases of 20.96% O_2 and 20.1% CO_2 were used to establish the initial instrument calibrations. Calibration gases of 12.1% O_2/6.02% CO_2 and 5.95% O_2/12.1% CO_2 were used to determine the calibration error of the analyzers. The sampling system (from the back of the stack probe to the analyzers) was injected using the 12.1% O_2/6.02% CO_2 gas to determine the system bias. After each sample, a system zero and system injection of 12.1%

O_2/6.02% CO_2 were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzers were calibrated to the output of the data acquisition system (DAS) used to collect the data from the Harsell Baghouse inlet. The analyzer averages were corrected for calibration error and drift using formula EQ.7E-5 from 40 CFR Part 60, Appendix A, Method 7E. A diagram of the sampling train is shown in Figure 5.

V.8 Exhaust Gas Parameters – The exhaust gas parameters (air flow rate, temperature, moisture and density) were determined in conjunction with the other sampling by employing U.S. EPA Methods 1 through 4.

All the sources except the Harsell Baghouse have demonstrated ambient air (20.9% O_2 & 0.0 % CO_2) gas composition in the past. The ambient air default values were used to calculate gas density for all the sources except the Harsell Baghouse exhaust.

Air flow rates, temperatures and moistures were determined using the Method 17 & Method 5 (isokinetic) sampling trains. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

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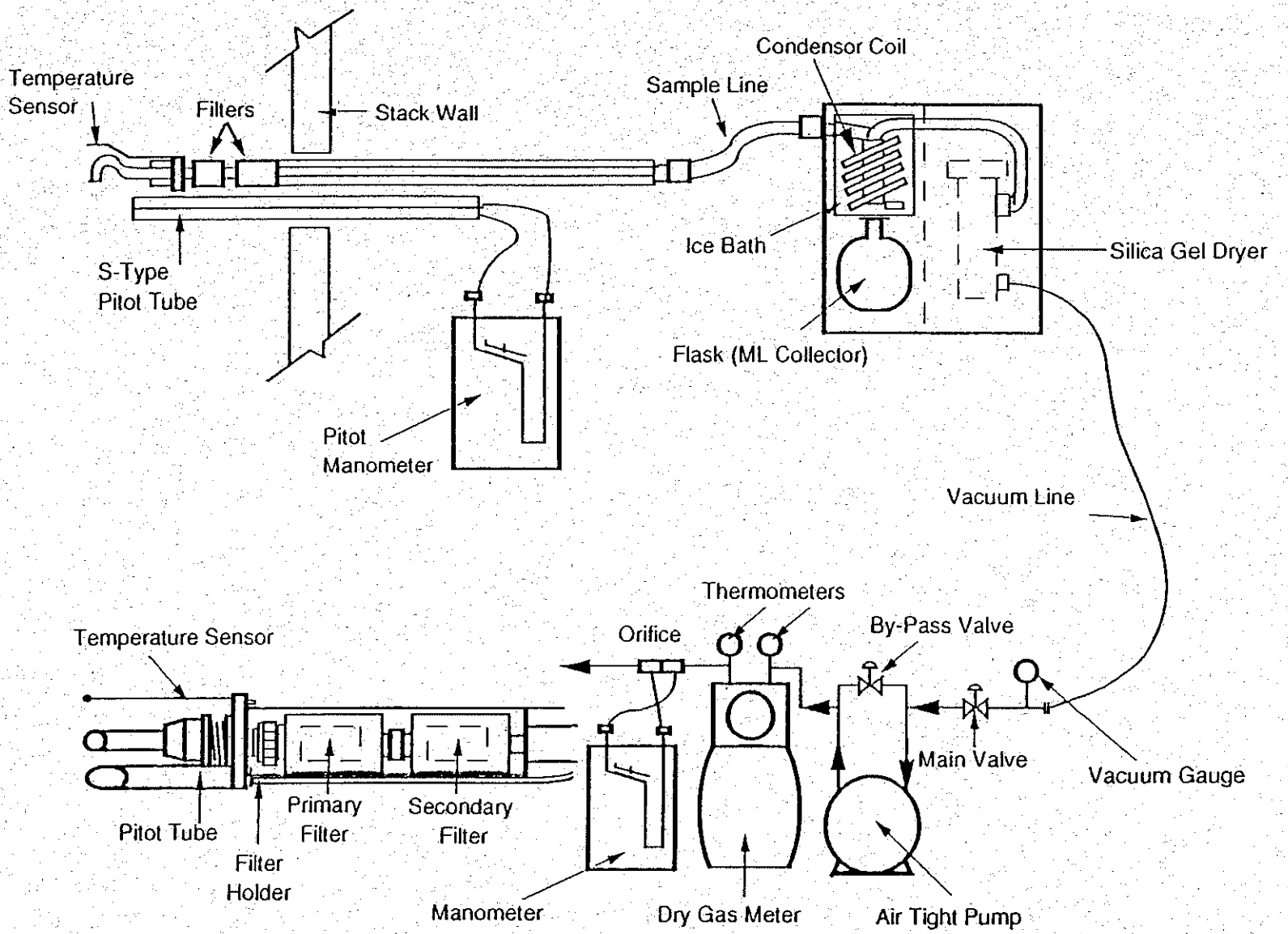

Figure 1

Particulate Sampling Train

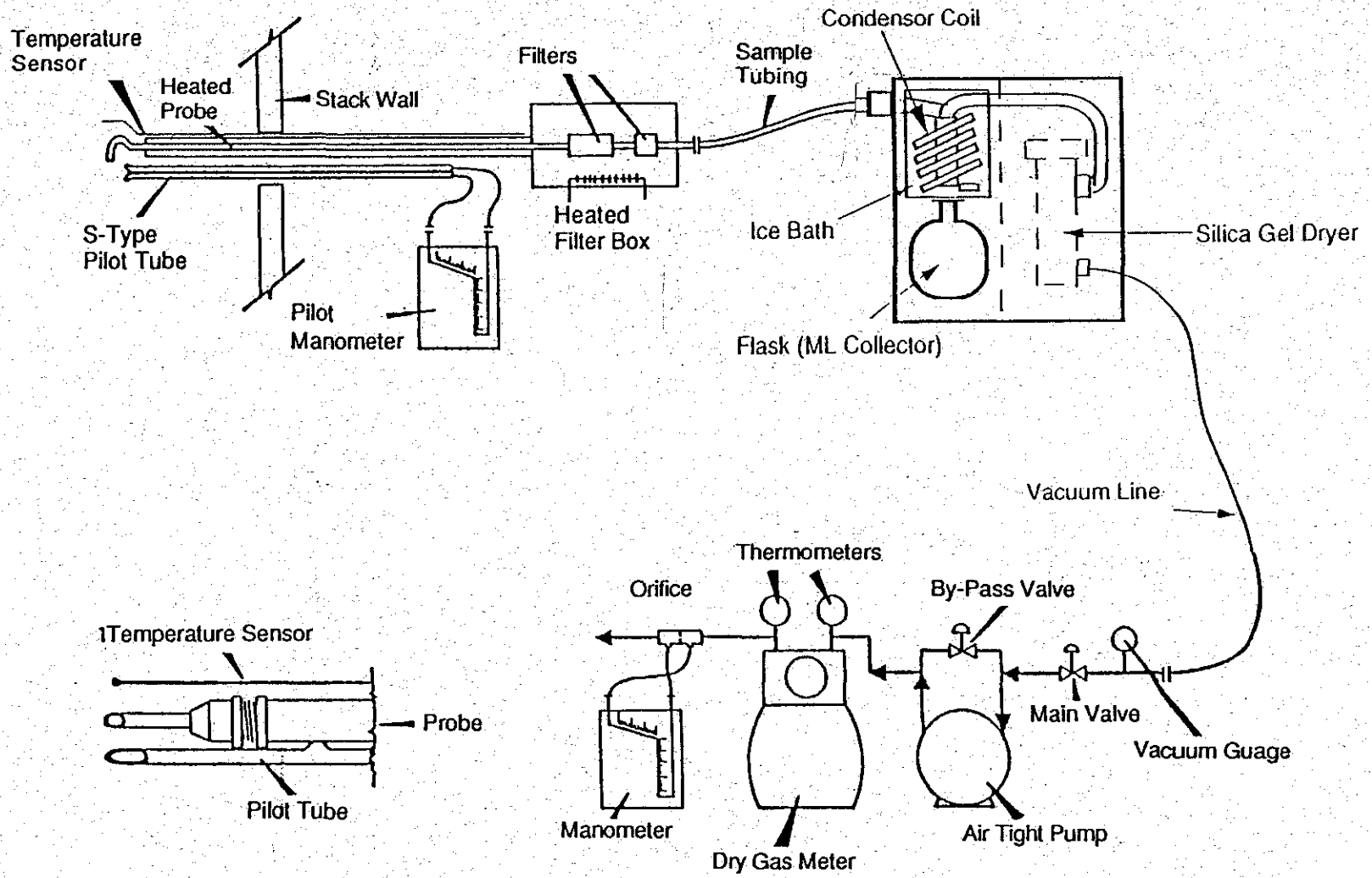

Figure 2

Particulate Sampling Train (Inlets Only)

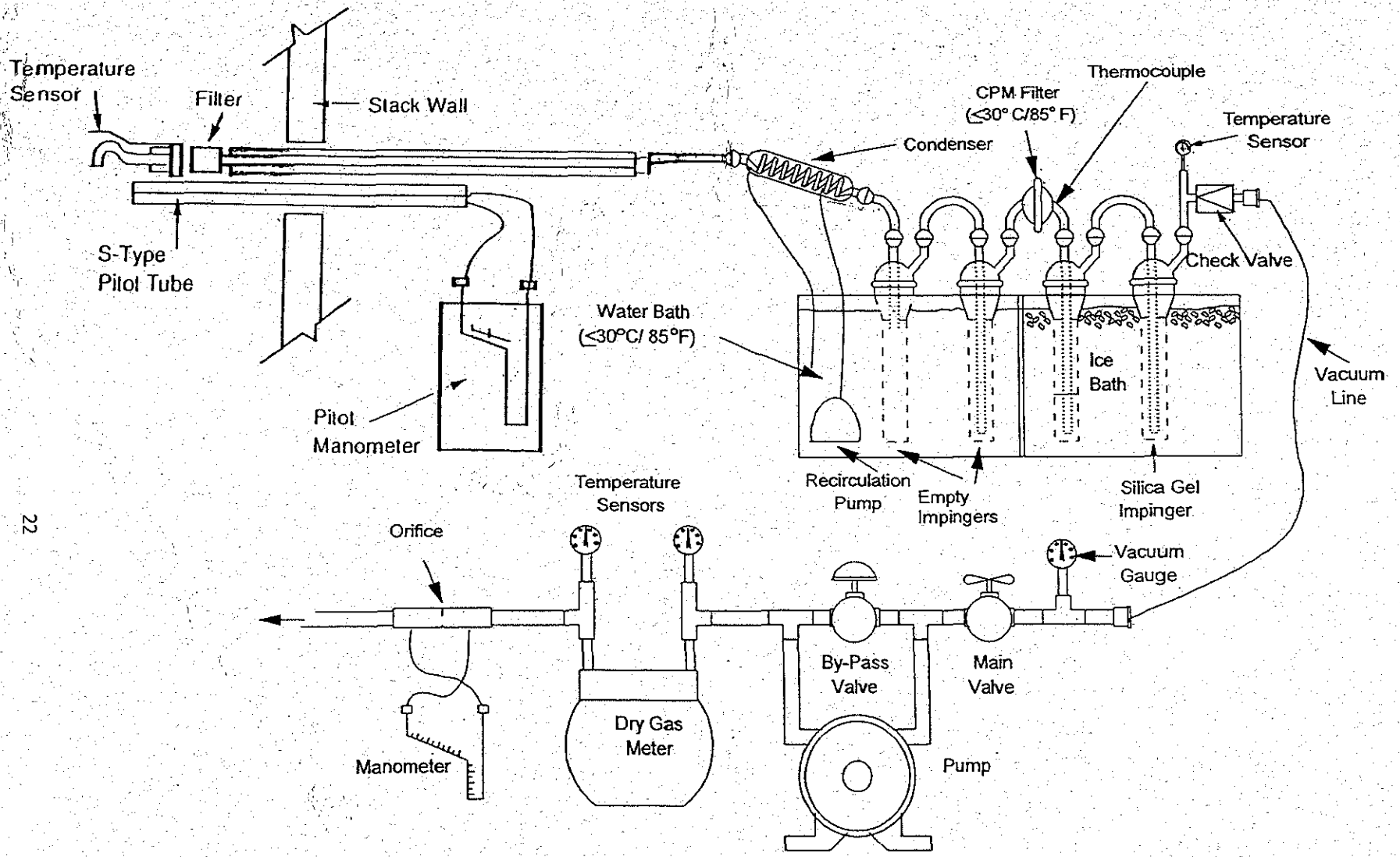

Figure 3

PM-10 Sampling Train (LML Only)

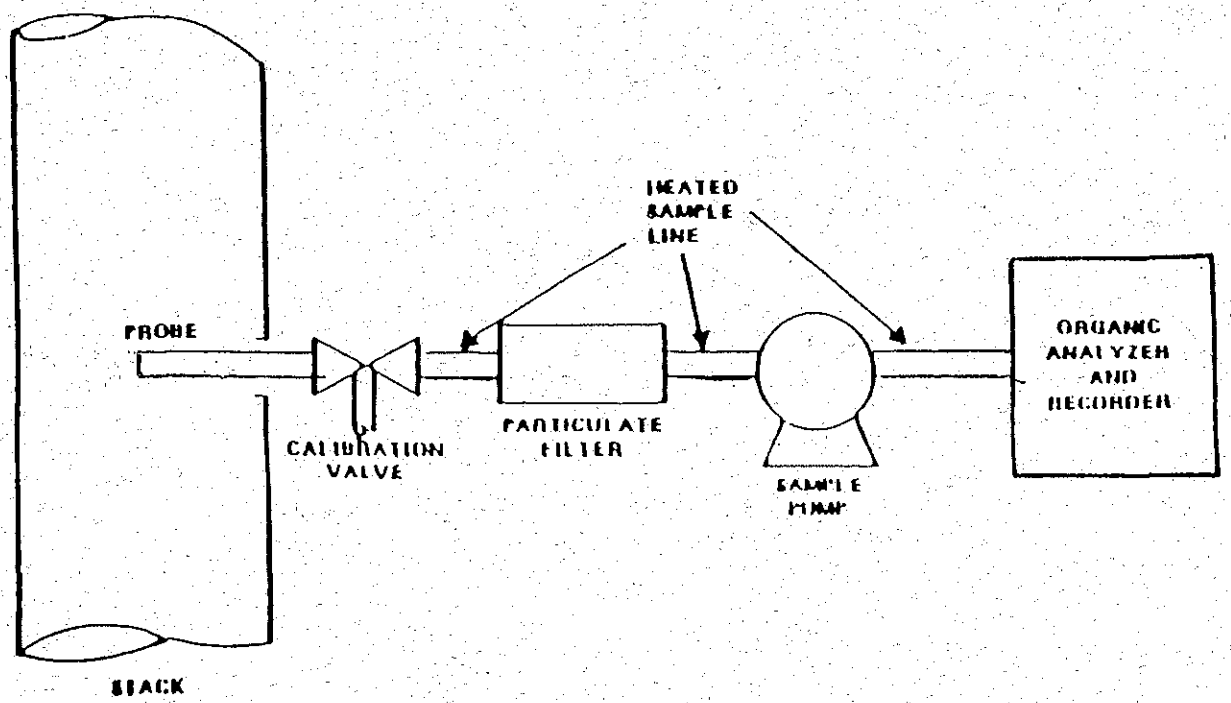

Figure 4

VO HAP Sampling Train
(Harsell Baghouse Only)

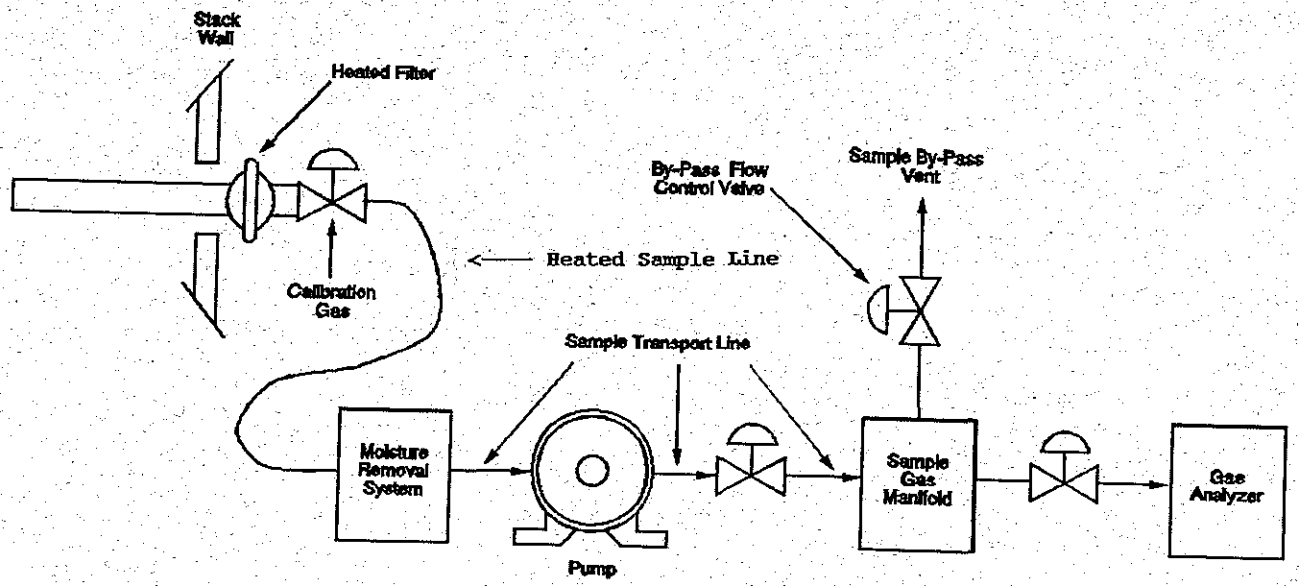

Figure 5

CO, O_2 & CO_2 Sampling Train (Harsell Baghouse Only)