I. INTRODUCTION

Network Environmental, Inc. was retained by Asama Coldwater Manufacturing, Inc. of Coldwater, Michigan, to conduct an emission study at their facility. The purpose of the study was to document compliance with Michigan Department of Environment, Great Lakes and Energy (EGLE) – Air Quality Division Renewable Operating Permit (ROP) No: MI-ROP-N5814-2015 and Permit to Install No. 184-17. The following sources were sampled:

Source	Compounds Sampled
DISA-606 (EU-MCS-S1)	Particulate (Filterable & Condensable), CO & VOC's
DISA-608 (EU-SS-S1)	Particulate (Filterable & Condensable) & VOC's
DISA-602 (EU-MP-S1)	Particulate (Filterable & Condensable), CO & VOC's
GF-608 (EU-MPCC-S1)	Particulate (Filterable Only), CO & VOC's
GF-610 (EU-SANDSYSTEM-S1)	Particulate (Filterable Only), CO & VOC's
DISA-604 (EU-CCFBACK-S1)	Particulate (Filterable & Condensable)
FGGRINDERS (EUGRINDER1 & EUGRINDER2)	Particulate (Filterable & Condensable)

The following test methods were employed to conduct the sampling:

- Filterable Particulate Matter – U.S. EPA Method 17 (DISA 606, 608 & 604, GF-610 & (FGGRINDERS) & U.S. EPA Method 5 (DISA-602 & GF-608)
- Condensable Particulate Matter – U.S. EPA Method 202
- Total Hydrocarbons (VOC's) – U.S. EPA Method 25A
- Carbon Monoxide (CO) – U.S. EPA Method 10
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Reference Methods 1 through 4.

The sampling was performed over the period of June 22-25 & July 14-17, 2020 by Stephan K. Byrd, R. Scott Cargill, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc.. Assisting with the sampling was Mr. Chad Marsh of Asama Coldwater Manufacturing, Inc. (ACM). Ms. Amanda Chapel and Mr. Matthew Karl of EGLE – Air Quality Division were present to observe the sampling and source operation.

II.1.1 TABLE 1 (PAGE 1 OF 3)
PARTICULATE EMISSION RESULTS
ASAMA COLDWATER MANUFACTURING, INC.
COLDWATER, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Particulate Concentration Grains/DSCF (2)			Particulate Mass Rate Lbs/Hr (3)		
					Front Half Filterable	Back Half Condensable	Total	Front Half Filterable	Back Half Condensable	Total
DISA-606 (EU-MCS-S1)	1	6/25/20	08:44-09:49	48,616	0.00009	0.0021	0.0022	0.04	0.88	0.92
	2	6/25/20	10:19-11:23	50,118	0.00026	0.0019	0.0021	0.11	0.80	0.91
	3	6/25/20	13:09-14:12	49,732	0.00049	0.0023	0.0028	0.21	0.99	1.20
	Average			**49,489**	**0.00028**	**0.0021**	**0.0024**	**0.12**	**0.89**	**1.01**
DISA-608 (EU-SS-S1)	1	6/24/20	09:14-10:17	44,762	0.00026	0.0013	0.0016	0.10	0.52	0.62
	2	6/24/20	10:40-11:43	45,447	0.00018	0.0007	0.0009	0.07	0.28	0.35
	3	6/24/20	12:09-18:15	46,676	0.00051	0.0009	0.0014	0.21	0.35	0.55
	Average			**45,628**	**0.00032**	**0.0010**	**0.0013**	**0.13**	**0.38**	**0.51**
DISA-602 (EU-MP-S1)	1	6/23/20	10:17-11:47	25,534	0.00034	0.00082	0.0012	0.075	0.18	0.25
	2	6/23/20	12:40-14:06	25,780	0.00011	0.00083	0.0009	0.024	0.18	0.21
	3	6/23/20	14:47-16:14	25,088	0.00027	0.00093	0.0012	0.057	0.20	0.26
	Average			**25,467**	**0.00024**	**0.00086**	**0.0011**	**0.052**	**0.19**	**0.24**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 In. Hg)
(2) Grains/DSCF = Grains Of Particulate Per Dry Standard Cubic Foot Of Exhaust Gas
(3) Lbs/Hr = Pounds Of Particulate Per Hour

II.1.2 TABLE 1 (PAGE 2 OF 3)
PARTICULATE EMISSION RESULTS
ASAMA COLDWATER MANUFACTURING, INC.
COLDWATER, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM [1]	Particulate Concentration Grains/DSCF [2]			Particulate Mass Rate Lbs/Hr [3]		
					Front Half Filterable	Back Half Condensable	Total	Front Half Filterable	Back Half Condensable	Total
GF-608 (EU-MPCC-S1)	1	7/16/20	11:59-13:27	36,135	0.00008	N.A.[4]	N.A.[4]	0.024	N.A.[4]	N.A.[4]
	2	7/16/20	13:38-15:05	35,896	0.00006	N.A.[4]	N.A.[4]	0.018	N.A.[4]	N.A.[4]
	3	7/17/20	07:57-09:24	37,041	0.00006	N.A.[4]	N.A.[4]	0.018	N.A.[4]	N.A.[4]
	Average			**36,357**	**0.00006**	----	----	**0.020**	----	----
GF-610 (EU-SANDSYSTEM-S1)	1	7/14/20	08:30-09:56	68,979	0.00013	N.A.[4]	N.A.[4]	0.075	N.A.[4]	N.A.[4]
	2	7/14/20	10:11-11:33	68,170	0.00006	N.A.[4]	N.A.[4]	0.038	N.A.[4]	N.A.[4]
	3	7/14/20	11:46-13:19	66,427	0.00011	N.A.[4]	N.A.[4]	0.062	N.A.[4]	N.A.[4]
	Average			**67,859**	**0.00010**	----	----	**0.058**	----	----
DISA-604 (EU-CCFBACK-S1)	1	7/15/20	08:50-10:12	51,709	0.0035	0.0011	0.0046	1.55	0.50	2.04
	2	7/15/20	10:35-11:39	50,473	0.0029	0.0011	0.0040	1.25	0.49	1.74
	3	7/15/20	12:06-13:10	50,742	0.0031	0.0011	0.0042	1.34	0.48	1.81
	Average			**50,975**	**0.0032**	**0.0011**	**0.0043**	**1.38**	**0.49**	**1.87**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 In. Hg)
(2) Grains/DSCF = Grains Of Particulate Per Dry Standard Cubic Foot Of Exhaust Gas
(3) Lbs/Hr = Pounds Of Particulate Per Hour
(4) N.A. = Not Applicable

II.1.3 TABLE 1 (PAGE 3 OF 3)
PARTICULATE EMISSION RESULTS
ASAMA COLDWATER MANUFACTURING, INC.
COLDWATER, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Particulate Concentration Lbs/1000 Lbs, Dry (2)			Particulate Mass Rate Lbs/Hr (3)		
					Front Half Filterable	Back Half Condensable	Total	Front Half Filterable	Back Half Condensable	Total
FGGRINDERS	1	6/22/20	15:27-16:38	59,851	0.00027	0.0023	0.0026	0.073	0.61	0.68
	2	6/22/20	17:13-18:17	59,847	0.00016	0.0021	0.0023	0.043	0.57	0.61
	3	6/22/20	18:46-19:55	59,155	0.00038	0.0019	0.0023	0.099	0.51	0.61
	Average			**59,618**	**0.00027**	**0.0021**	**0.0024**	**0.072**	**0.56**	**0.64**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 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.2 TABLE 2
TOTAL HYDROCARBON (VOC) EMISSION RESULTS
ASAMA COLDWATER MANUFACTURING, INC.
COLDWATER, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	VOC Concentration PPM (2)	VOC Mass Rate Lbs/Hr (3)
DISA-606 (EU-MCS-S1)	1	6/25/20	08:31-09:31	51,433	6.3	2.21
	2	6/25/20	09:50-10:50		6.3	2.21
	3	6/25/20	13:10-14:10		6.5	2.28
	Average				**6.4**	**2.23**
DISA-608 (EU-SS-S1)	1	6/24/20	08:19-09:19	47,149	1.3	0.42
	2	6/24/20	09:28-10:28		1.4	0.45
	3	6/24/20	10:38-11:38		1.3	0.42
	Average				**1.3**	**0.43**
DISA-602 (EU-MP-S1)	1	6/23/20	09:57-10:57	25,931	6.4	1.13
	2	6/23/20	11:18-12:18		7.9	1.40
	3	6/23/20	12:41-13:41		8.0	1.42
	Average				**7.4**	**1.32**
GF-608 (EU-MPCC-S1)	1	7/16/20	09:12-10:19	37,233	23.3	5.93
	2	7/16/20	10:38-11:38		26.5	6.74
	3	7/16/20	11:58-13:04		25.4	6.46
	Average				**25.1**	**6.38**
GF-610 (EU-SANDSYSTEM-S1)	1	7/14/20	08:41-09:44	70,285	4.6	2.21
	2	7/14/20	10:03-11:03		4.4	2.11
	3	7/14/20	11:22-12:22		4.4	2.11
	Average				**4.5**	**2.14**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg). Shown is the average air flow rate measured during the particulate sampling.
(2) PPM = Parts Per Million (v/v) On A Wet (Actual) Basis As Propane
(3) Lbs/Hr = Pounds of VOC Per Hour As Propane

II.3 TABLE 3
CARBON MONOXIDE (CO) EMISSION RESULTS
ASAMA COLDWATER MANUFACTURING, INC.
COLDWATER, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	CO Concentration PPM (2)	CO Mass Rate Lbs/Hr (3)
DISA-606 (EU-MCS-S1)	1	6/25/20	08:31-09:31	49,489	57.8	12.44
	2	6/25/20	09:50-10:50		46.3	9.96
	3	6/25/20	13:10-14:10		68.4	14.72
	Average				**57.5**	**12.37**
DISA-602 (EU-MP-S1)	1	6/23/20	09:57-10:57	25,467	51.6	5.71
	2	6/23/20	11:18-12:18		73.6	8.15
	3	6/23/20	12:41-13:41		68.2	7.55
	Average				**64.5**	**7.14**
GF-608 (EU-MPCC-S1)	1	7/16/20	09:12-10:19	36,357	140.1	22.15
	2	7/16/20	10:38-11:38		164.1	25.94
	3	7/16/20	11:58-13:04		153.8	24.31
	Average				**152.7**	**24.13**
GF-610 (EU-SANDSYSTEM-S1)	1	7/14/20	08:41-09:44	67,859	4.6	1.36
	2	7/14/20	10:03-11:03		4.2	1.24
	3	7/14/20	11:22-12:22		4.4	1.30
	Average				**4.4**	**1.30**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 ºF & 29.92 in. Hg). Shown is the average air flow rate measured during the particulate sampling.
(2) PPM = Parts Per Million (v/v) On A Dry Basis
(3) Lbs/Hr = Pounds of CO Per Hour

III. DISCUSSION OF RESULTS

The results of the sampling are summarized in Tables 1 through 3 (Sections II.1 through II.3). The results are presented as follows:

III.1 Particulate Emission Results (Table 1)

Table 1 summarizes the particulate emission results as follows:

- Source
- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentrations (Grains/DSCF) – Grains Of Particulate Per Dry Standard Cubic Foot Of Exhaust Gas (Every source except FGGRINDERS)
- Particulate Concentrations (Lbs/1000 Lbs, Dry) – Pounds Of Particulate Per Thousand Pounds Of Exhaust Gas On A Dry Basis (FGGRINDERS Only)
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds Of Particulate Per Hour

A more detailed breakdown of each individual particulate sample can be found in Appendix A.

It should be noted that condensable particulate sampling was not required for the GF-608 (EU-MPCC-S1) and the GF-610 (EU-SANDSYSTEM-S1) exhausts.

III.2 Total Hydrocarbon (VOC) Emission Results (Table 2)

Table 2 summarizes the VOC emission results as follows:

- Source
- Sample
- Date
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- VOC Concentration (PPM) – Parts Per Million (v/v) On An Actual (Wet) Basis As Propane
- VOC Mass Emission Rate (Lbs/Hr) – Pounds Of VOC Per Hour As Propane. The average air flow rate determined during the particulate sampling was used to calculate the Lbs/Hr.

III.3 Carbon Monoxide (CO) Emission Results (Table 3)

Table 3 summarizes the CO emission results as follows:

- Source
- 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 average air flow rate determined during the particulate sampling was used to calculate the Lbs/Hr.

III.4 Emission Limits

MI-ROP-N5814-2015 and Permit to Install No. 184-17 has established the following emission limits for these sources:

Source	Emission Limits
DISA-606 (EU-MCS-S1)	**Volatile Organic HAP (VOHAP):** 20 PPMV (Flow Weighted Avg.), **PM10:** 2.47 Lbs/Hr, **VOC:** 15.49 Lbs/Hr & **CO:** 62.70 Lbs/Hr
DISA-608 (EU-SS-S1)	**PM10:** 2.30 Lbs/Hr & **VOC:** 4.00 Lbs/Hr
DISA-602 (EU-MP-S1)	**PM:** 0.001 Grains/DSCF **or Total Metal HAP:** 0.00008 Grains/DSCF (MACT Requirement) **PM10:** 0.30 Lbs/Hr, **VOC:** 5.28 Lbs/Hr & **CO:** 44.55 Lbs/Hr
GF-608 (EU-MPCC-S1)	**PM:** 0.005 Grains/DSCF or 2.1 Lbs/Hr **or Total Metal HAP:** 0.0004 Grains/DSCF (MACT Requirement) **VOC:** 10.0 Lbs/Hr & **CO:** 57.5 Lbs/Hr
GF-610 (EU-SANDSYSTEM-S1)	**PM:** 0.005 Grains/DSCF or 2.8 Lbs/Hr, **VOC:** 6.0 Lbs/Hr & **CO:** 7.5 Lbs/Hr
DISA-604 (EU-CCFBACK-S1)	**PM10:** 2.64 Lbs/Hr
FGGRINDERS (EUGRINDER1 & EUGRINDER2)	**PM:** 0.016 Lbs/1000 Lbs & 5.13 Lbs/Hr, **PM10:** 3.07 Lbs/Hr & **PM2.5:** 2.05 Lbs/Hr

IV. SOURCE DESCRIPTION

The following table is a description of the sources sampled:

Source	Source Description
DISA-606 (EU-MCS-S1)	Consists of the automated mold cooling conveyors and automated sand shakeout lines, including a flat deck shakeout system. Emissions from these processes are controlled by associated hoods, enclosures, ductwork, a baghouse and a regenerative thermal oxidizer.
DISA-608 (EU-SS-S1)	Consists of the molding machine and related sand handling equipment. Emissions from the mold making process are controlled by associated hoods, enclosures, ductwork and a baghouse.
DISA-602 (EU-MP-S1)	Consists of two (2) electric induction melting furnaces with an 11 Ton holding capacity (each) and a monorail pouring station with three (3) ladles. Emissions from these melting and pouring processes are controlled by associated hoods, enclosures, ductwork and a baghouse.
GF-608 (EU-MPCC-S1)	Metal melting, pouring and casting cooling process equipment with two (2) electric induction furnaces. The furnaces have a combined daily average melting capacity of 8 Tons/Hr. Emissions from these processes are controlled by a baghouse.
GF-610 (EU-SANDSYSTEM-S1)	Mold making, shakeout and sand processing equipment. Emissions from these processes are controlled by a baghouse.
DISA-604 (EU-CCFBACK-S1)	Consists of the back section of casting cooling conveyors and a shot blast machine. Emissions from these processes are controlled by associated hoods, enclosures, ductwork and a baghouse.
FGGRINDERS (EUGRINDER1 & EUGRINDER2)	Two (2) Reichmann grinders for automatic deburring of round parts including brake discs, clutch plates and other miscellaneous metal parts. The grinders are exhausted to a Waltz-Holtz Dustar 70,000 ACFM reverse air fabric filter collector. The fabric filter collector is used for in plant environment control.

V. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location for each source was as follows:

- DISA-606 (EU-MCS-S1) – A 59 inch I.D. diameter exhaust stack with 2 sample ports in a location approximately 6 duct diameters downstream and greater than 2 duct diameters upstream from the nearest disturbances. Twenty (20) sampling points were used for the isokinetic sampling on this source.

- DISA-608 (EU-SS-S1) – A 51 inch I.D. diameter exhaust stack with 2 sample ports in a location greater than 8 duct diameters downstream and 2 duct diameters upstream from the nearest disturbances. Twelve (12) sampling points were used for the isokinetic sampling on this source.

- DISA-602 (EU-MP-S1) – A 41 inch I.D. diameter exhaust stack with 2 sample ports in a location greater than 8 duct diameters downstream and 2 duct diameters upstream from the nearest disturbances. Twelve (12) sampling points were used for the isokinetic sampling on this source.

- GF-608 (EU-MPCC-S1) – A 52 inch I.D. diameter exhaust stack with 2 sample ports in a location greater than 8 duct diameters downstream and 2 duct diameters upstream from the nearest disturbances. Twelve (12) sampling points were used for the isokinetic sampling on this source.

- GF-610 (EU-SANDSYSTEM-S1) – A 46 inch x 76 inch exhaust duct with 5 sample ports in a location approximately 2 duct diameters downstream and 2 duct diameters upstream from the nearest disturbances. Twenty-five (25) sampling points were used for the isokinetic sampling on this source.

- DISA-604 (EU-CCFBACK-S1) – A 54 inch I.D. diameter exhaust stack with 2 sample ports in a location greater than 8 duct diameters downstream and 2 duct diameters upstream from the nearest disturbances. Twelve (12) sampling points were used for the isokinetic sampling on this source.

- FGGRINDERS– A 60 inch I.D. diameter exhaust stack with 2 sample ports in a location approximately 6 duct diameters downstream and greater than 2 duct diameters upstream from the nearest disturbances. Twenty (20) sampling points were used for the isokinetic sampling on this source.

The following test methods were employed to conduct the sampling:

- Filterable Particulate Matter – U.S. EPA Method 17 (DISA 606, 608 & 604, GF-610 & FGGRINDERS) & U.S. EPA Method 5 (DISA-602 & GF-608)
- Condensable Particulate Matter – U.S. EPA Method 202
- Total Hydrocarbons (VOC's) – U.S. EPA Method 25A
- Carbon Monoxide (CO) – U.S. EPA Method 10
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Reference Methods 1 through 4.

V.1 Particulate (DISA – 604, 606, 608 & FGGRINDERS) – The particulate emission sampling on these sources was conducted in accordance with U.S. EPA Method 17. Method 17 is an in-stack filtration method. Three (3) samples were collected from each source. Each sample was sixty (60) minutes in duration and had minimum sample volumes of thirty (30) dry standard cubic feet. The samples were collected isokinetically and analyzed for Particulate by gravimetric analysis.

In addition to the standard front half analysis, the back half condensable particulate matter was determined in accordance with U.S. EPA Method 202 (Dry Impinger Technique). A sixty (60) minute nitrogen purge (as specified in Method 202) was conducted (if necessary) for the back half condensables immediately following each sample. The back half samples were extracted and analyzed for condensable particulate in accordance with Method 202. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis. The particulate (Methods 17/202) sampling train is shown in Figure 1.

V.2 Particulate (GF – 610) – The particulate emission sampling on this source was conducted in accordance with U.S. EPA Method 17. Method 17 is an in-stack filtration method. Three (3) samples were collected. Each sample was seventy-five (75) minutes in duration and had minimum sample volumes of thirty (30) dry standard cubic feet. The samples were collected isokinetically and analyzed for 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 (Method 17) sampling train is shown in Figure 2.

V.3 Particulate (DISA – 602) – The particulate emission sampling on this source was conducted in accordance with U.S. EPA Method 5. Method 5 is an out-stack filtration method. Three (3) samples were collected from the location. Each sample was eighty-four (84) minutes in duration and had minimum sample volumes of sixty (60) dry standard cubic feet. The sampling systems were operated isokinetically. The sampling system (probe & filter holder) were maintained at 250 °F (plus or minus 25 °F).

In addition to the standard front half analysis, the back half condensable particulate matter was determined in accordance with U.S. EPA Method 202 (Dry Impinger Technique). A sixty (60) minute nitrogen purge (as specified in Method 202) was conducted (if necessary) for the back half condensables immediately following each sample. The back half samples were extracted and analyzed for condensable particulate in accordance with Method 202. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis. The particulate (Methods 5/202) sampling train is shown in Figure 3.

V.4 Particulate (GF – 608) – The particulate emission sampling on this source was conducted in accordance with U.S. EPA Method 5. Method 5 is an out-stack filtration method. Three (3) samples were collected from the location. Each sample was eighty-four (84) minutes in duration and had minimum sample volumes of sixty (60) dry standard cubic feet. The sampling systems were operated isokinetically. The sampling system (probe & filter holder) were maintained at 250 °F (plus or minus 25 °F).

The samples were collected isokinetically and analyzed for 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 (Method 5) sampling train is shown in Figure 4.

V.5 Total Hydrocarbons (VOC) – The VOC 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 sources sampled. 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 94.9 PPM Propane was used to establish the initial instrument calibration. Calibration gases of 30.2 PPM and 50.6 PPM Propane were used to determine the calibration error of the analyzer. After each sample, a system zero and system injection of 30.2 PPM Propane were performed to establish system drift and system bias during the test period. All calibration gases used were EPA Protocol Calibration Gases. Three (3) samples were collected from each of the sources sampled. 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 exhausts. The analyzer averages were corrected for calibration error and drift using formula EQ.7E-5 from 40 CFR Part 60, Appendix A, Method 7E. Figure 5 is a diagram of the VOC sampling train.

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 exhausts through heated teflon sample lines which led to a VIA MAK 2 sample gas conditioner and then to a Thermo 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 each of the exhausts sampled. Each sample was sixty (60) minutes in duration.

The analyzer was calibrated with EPA protocol CO calibration gases. Span gases of either 498.0, 168.0 or 89.7 PPM were used to establish the initial instrument calibration. Calibration gases of 251.0, 168.0, 89.7 PPM and 49.5 PPM were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) were injected using either the 168.0 PPM, 89.7 PPM or the 49.5 PPM gas to determine the system bias. After each sample, a system zero and system injection of either 168.0 PPM, 89.7 PPM or 49.5 PPM 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 exhausts. 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 6.

V.7 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. Air flow rates, temperatures and moistures were determined using the isokinetic sampling trains. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

The O_2 & CO_2 content was determined in accordance with U.S. EPA Reference Method 3A (for all the sources except DISA-604, DISA-608 & FGGRINDERS). Servomex Model 1400M portable stack gas analyzers were used to monitor the exhausts. 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 each of the sources sampled. Each sample was sixty (60) minutes in duration.

The analyzers were calibrated by direct injection prior to the testing. Span gases of 21.0% O_2 and 21.04% CO_2 were used to establish the initial instrument calibrations. Calibration gases of 12.0% O_2/5.95% CO_2 and 5.97% O_2/11.7% 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 12.0% O_2/5.95% CO_2 gas to determine the system bias. After each sample, a system zero and system injection 12.0% O_2/5.95%

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 exhausts. 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 6.

For the DISA-604, DISA-608 & FGGRINDERS exhaust, the ambient default values were used for the O_2 & CO_2 content.

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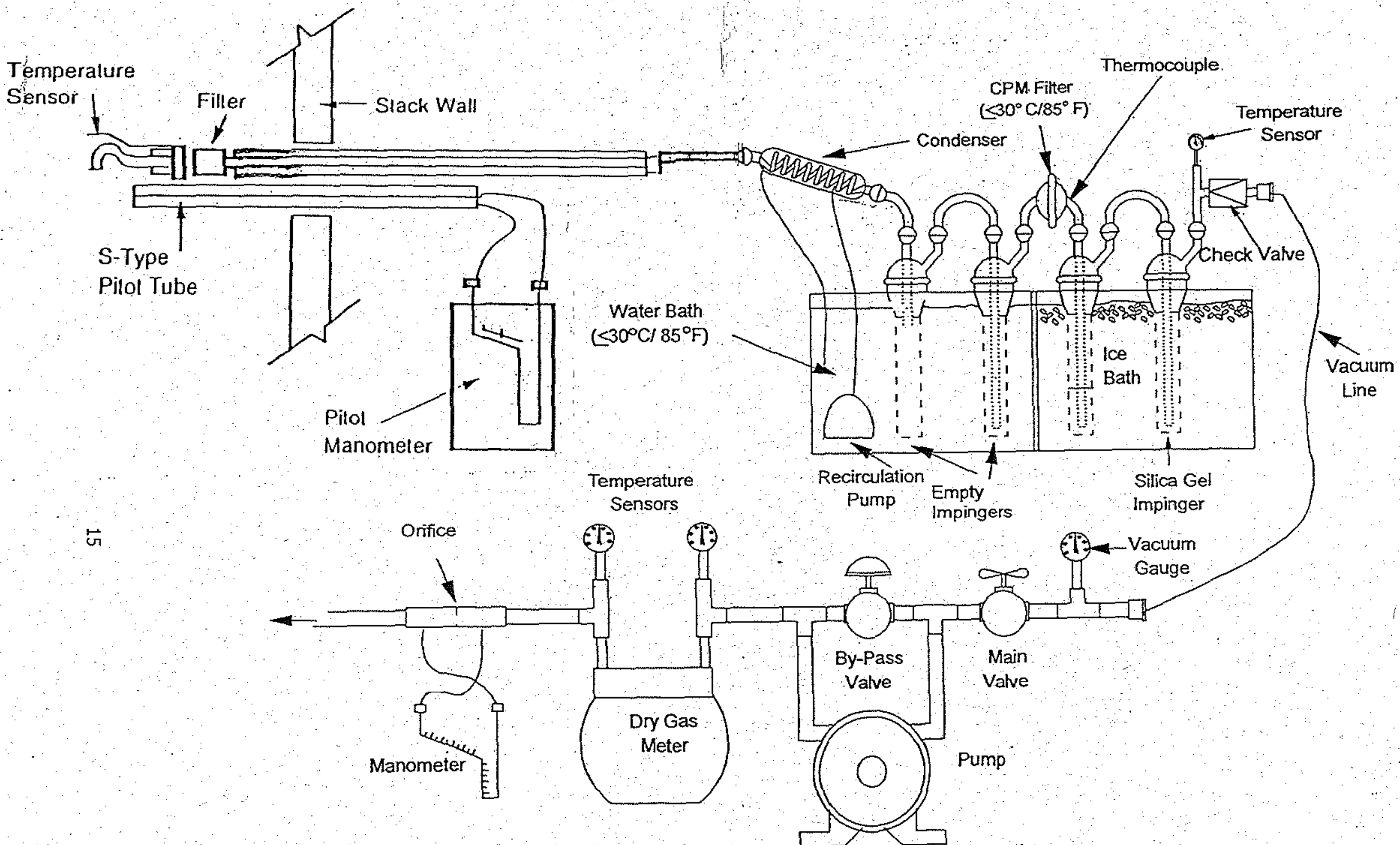

Figure 1

Particulate (Methods 17/202) Sampling Train (DISA-604, 606, 608 & FGGRINDERS)

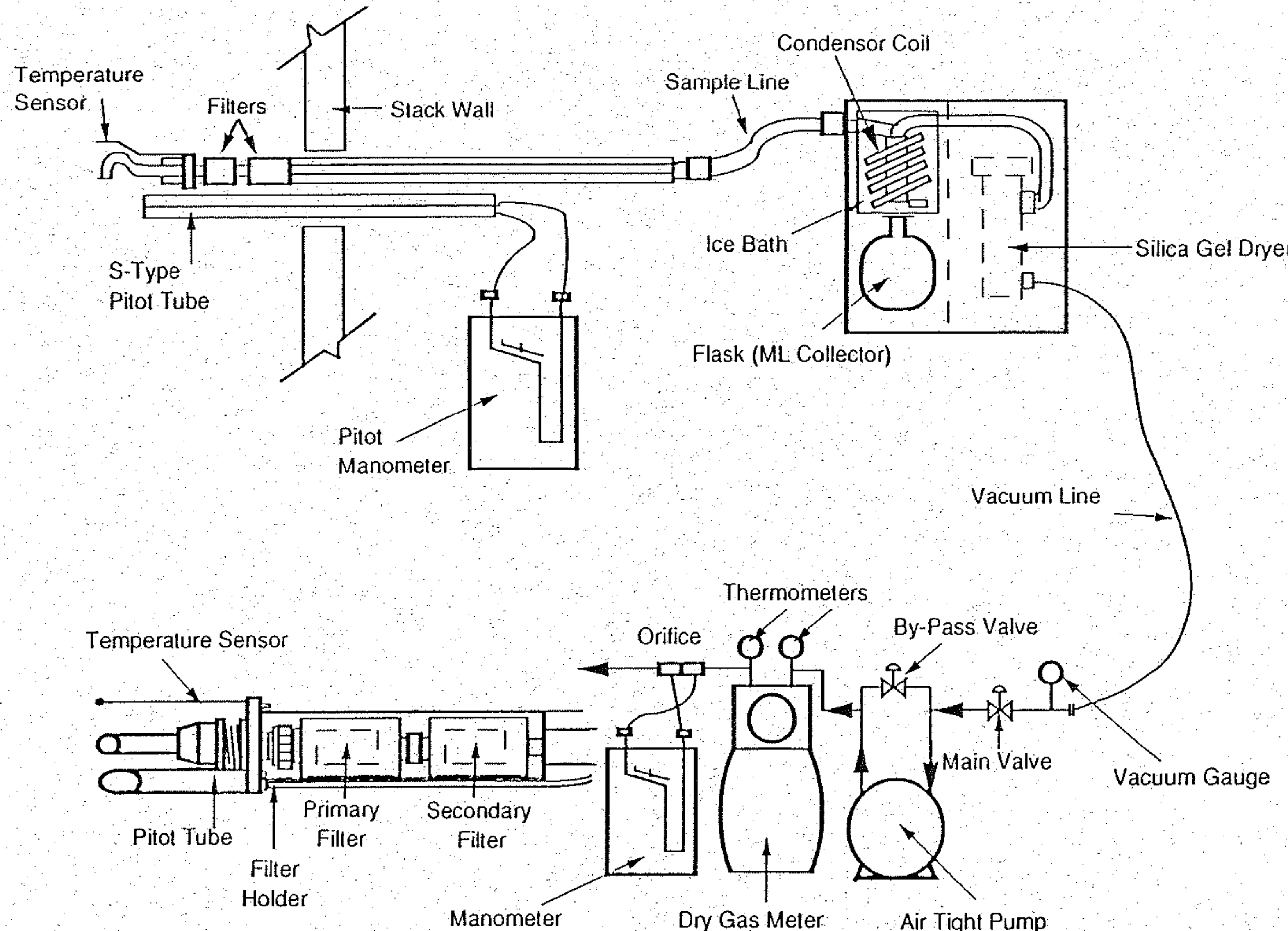

Figure 2

Particulate (Method 17) Sampling Train (GF-610)

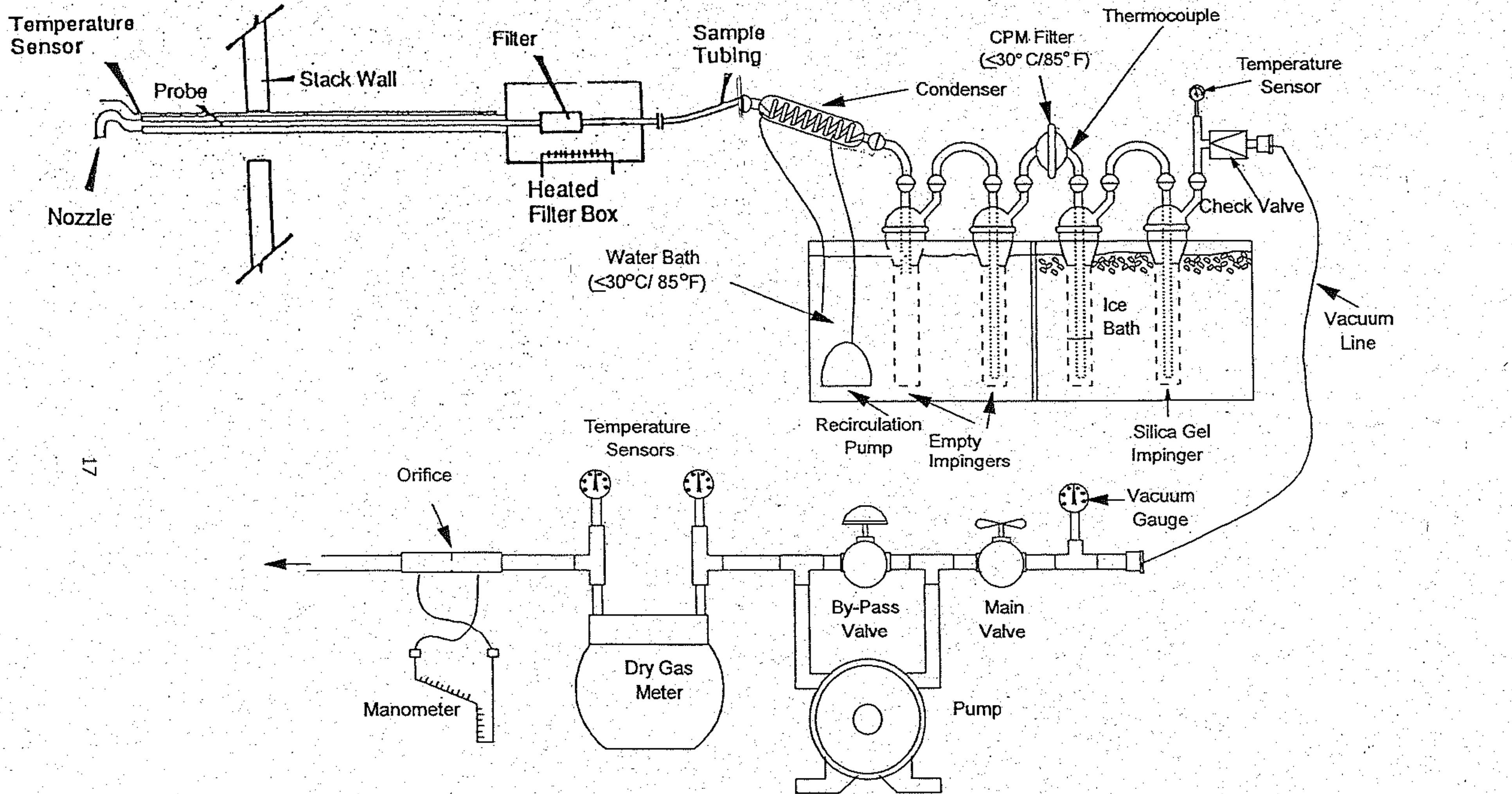

Figure 3

Particulate (Methods 5/202) Sampling Train (DISA-602)

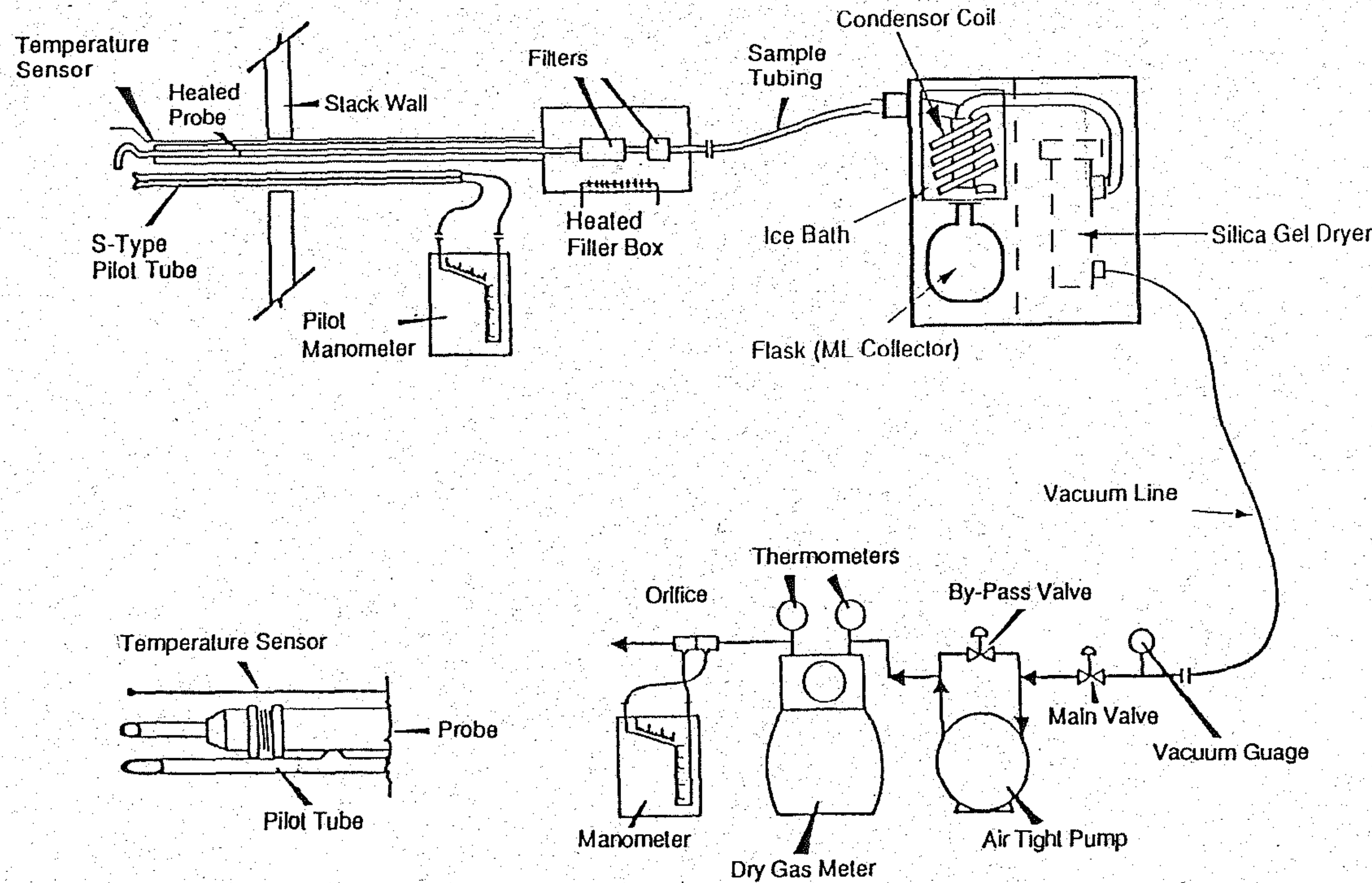

Figure 4

Particulate (Method 5) Sampling Train (GF-608)

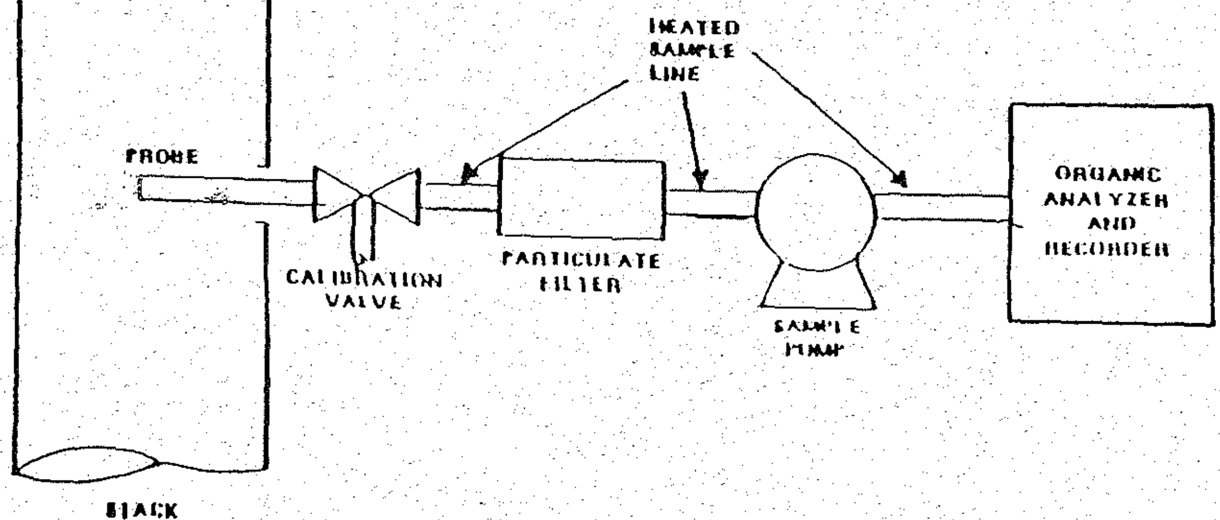

Figure 5

VOC Sampling Train

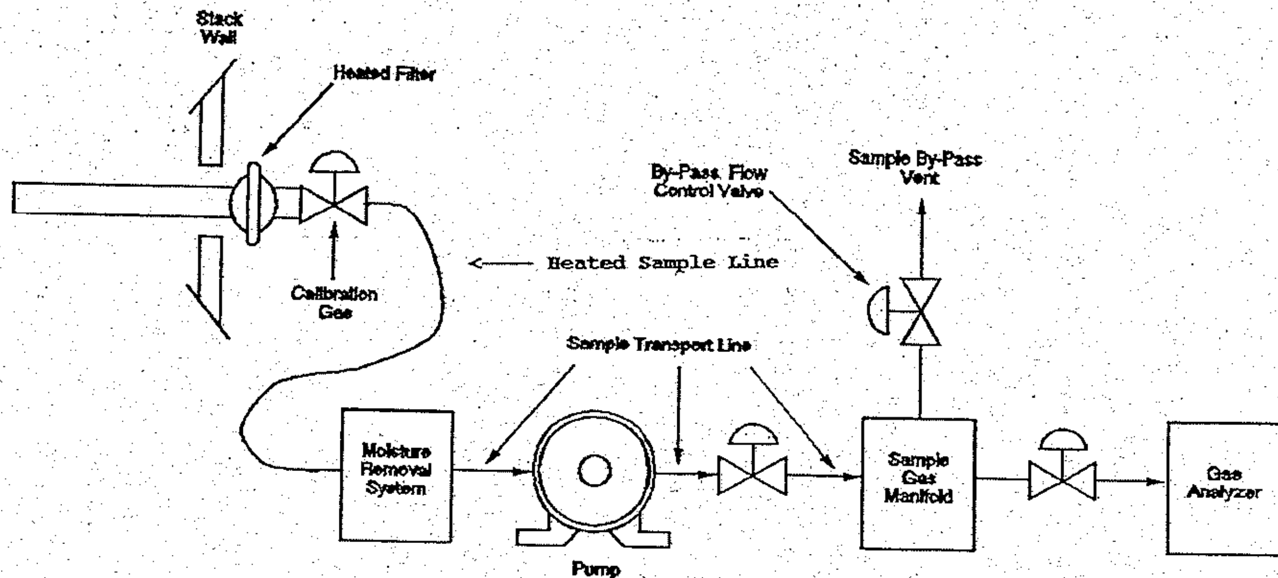

Figure 6

CO, O_2 & CO_2 Sampling Train