TABLE OF CONTENTS

Appendices

I. INTRODUCTION

Network Environmental, Inc. was retained by CWC Textron of Muskegon, Michigan to conduct compliance emission sampling at their facility. The purpose of the sampling was to meet the testing requirements of the State of Michigan Renewable Operating Permit (ROP) Number MI-ROP-B1909-2019a.

The following is a list of the sources that were sampled and the emission limits for each source:

Source	Compound(s) To Be Sampled	Emission Limit(s)
EUPOURING Lines 1-4	Particulate, Total Hydrocarbons (VOC), Carbon Monoxide (CO) & Oxides of Nitrogen (NO_x)	**ROP:** Particulate: PM 0.27 Lbs/Ton of metal charged and 0.1Lbs/1000Lbs, Dry. PM-10 0.15 Lbs/Ton of metal charged, PM-2.5 0.08 Lbs/Ton metal charged and CO: 2.597 Lbs/Ton of metal charged. NO_x: 0.01 Lbs/Ton of metal charged; VOC: 0.14 Lbs/Ton of metal charged

The sampling in the study was conducted on April 12-18, 2023 by Stephan K. Byrd, R. Scott Cargill, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. Assisting with the study was Mr. Bob Meacham of CWC Textron and the operating staff of the facility. Mr. Eric Grinstern and Mr. Trevor Drost of the Michigan Department of Environment, Great Lakes and Energy (EGLE), Air Quality Division were present to observe the testing and source operation.

II. PRESENTATION OF RESULTS

II.1. TABLE 1
PARTICULATE EMISSION RESULTS
SVPOUR1-4
CWC TEXTRON
MUSKEGON, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration Lbs/1000Lbs, Dry(2)	Particulate Mass Rate	
						Lbs/Hr(3)	Lbs/Ton of Metal(4)
SVPOUR1	1	4/17/23	10:31-12:38	47,605	0.00383	0.816	0.0517
	2		13:34-14:39	47,439	0.00495	1.050	0.0665
	3		15:24-16:30	47,615	0.00323	0.688	0.0436
	Average			**47,553**	**0.00400**	**0.852**	**0.0539**
SVPOUR2	1	4/13/23	9:31-10:40	21,689	0.00678	0.658	0.0330
	2		11:23-12:34	21,079	0.00424	0.400	0.0201
	3		13:31-14:37	21,038	0.00507	0.477	0.0240
	Average			**21,269**	**0.00536**	**0.512**	**0.0257**
SVPOUR3	1	4/12/23	13:11-14:19	40,311	0.00296	0.535	0.0342
	2		15:08-17:09	40,258	0.00369	0.665	0.0426
	3		17:46-18:55	39,787	0.00674	1.200	0.0768
	Average			**40,199**	**0.00447**	**0.800**	**0.0512**
SVPOUR4	1	4/18/23	9:52-11:55	27,149	0.00323	0.394	0.0232
	2		12:29-13:23	27,243	0.00484	0.590	0.0347
	3		14:07-15:11	27,829	0.00211	0.262	0.0154
	Average			**27,407**	**0.00340**	**0.415**	**0.0244**
AVERAGE					**0.00431**	**0.645**	**0.0388**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per 1000 Pounds of Exhaust gas On A Dry Basis
(3) Lbs/Hr = Pounds of Particulate Per Hour
(4) Lbs/Ton of Metal = Pounds of Particulate Per Ton of Metal Processed. Calculated Using The Following Metal Process Rates: 15.79 Tons/Hr For SVPOUR1, 19.91 Tons/Hr For SVPOUR2, 15.62 Tons/Hr For SVPOUR3, and 16.98 Tons/Hr for SVPOUR4. Metal Process Rates Were Calculated Using Tons Of Metals Poured Data Supplied By CWC Textron.

II.1.2 TABLE 2
PM-10/2.5 PARTICULATE EMISSION RESULTS
SVPOUR1-4
CWC TEXTRON
MUSKEGON, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Particulate Mass Rate	
					Lbs/Hr (2)	Lbs/Ton of Metal (3)
SVPOUR1	1	4/17/23	10:31-12:38	47,605	0.816	0.0517
	2		13:34-14:39	47,439	1.050	0.0665
	3		15:24-16:30	47,615	0.688	0.0436
	Average			**47,553**	**0.852**	**0.0539**
SVPOUR2(4)	1	4/13/23	9:31-10:40	21,689	1.769	0.0890
	2		11:23-12:34	21,079	1.284	0.0645
	3		13:31-14:37	21,038	1.276	0.0641
	Average			**21,269**	**1.443**	**0.0725**
SVPOUR3	1	4/12/23	13:11-14:19	40,311	0.535	0.0342
	2		15:08-17:09	40,258	0.665	0.0426
	3		17:46-18:55	39,787	1.200	0.0768
	Average			**40,199**	**0.800**	**0.0512**
SVPOUR4	1	4/18/23	9:52-11:55	27,149	0.394	0.0232
	2		12:29-13:23	27,243	0.590	0.0347
	3		14:07-15:11	27,829	0.262	0.0154
	Average			**27,407**	**0.415**	**0.0244**
AVERAGE					**0.8775**	**0.0505**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/Hr = Pounds of Particulate Per Hour
(3) Lbs/Ton of Metal = Pounds of Particulate Per Ton of Metal Processed. Calculated Using The Following Metal Process Rates: 15.79 Tons/Hr For SVPOUR1, 19.91 Tons/Hr For SVPOUR2, 15.62 Tons/Hr For SVPOUR3, and 16.98 Tons/Hr for SVPOUR4. Metal Process Rates Were Calculated Using Tons Of Metals Poured Data Supplied By CWC Textron.
(4) SVPOUR2 was the only source above 85°F and calculated for PM-10,2.5 and total Particulate Per EPA Method 202.

II.3 TABLE 3
TOTAL HYDROCARBON (VOC) EMISSION RESULTS
SVPOUR1-4
CWC TEXTRON
MUSKEGON, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate SCFM (1)	VOC Concentration PPM (2)	VOC Mass Rates	
						Lbs/Hr (3)	Lbs/Ton (4)
SVPOUR1	1	4/17/23	10:32-12:33	48,103	6.7	2.2	0.139
	2		13:34-14:38	47,937	6.3	2.06	0.131
	3		15:24-16:29	48,146	5.9	1.94	0.123
	Average			**48,062**	**6.3**	**2.07**	**0.131**
SVPOUR2	1	4/13/23	9:31-10:39	21,966	7.0	1.05	0.053
	2		11:23-12:33	21,335	6.7	0.98	0.049
	3		13:32-14:36	21,293	7.4	1.08	0.054
	Average			**21,531**	**7.0**	**1.03**	**0.052**
SVPOUR3	1	4/12/23	13:11-14:18	40,808	9.1	2.54	0.162
	2		15:08-17:08	40,757	8.1	2.26	0.144
	3		17:47-18:54	40,202	8.9	2.44	0.157
	Average			**40,589**	**8.7**	**2.41**	**0.154**
SVPOUR4	1	4/18/23	9:52-11:53	27,382	11.8	2.21	0.130
	2		12:29-13:32	27,540	9.4	1.77	0.104
	3		14:07-15:09	28,169	9.8	1.89	0.111
	Average			**27,697**	**10.3**	**1.95**	**0.115**
AVERAGE					**8.1**	**1.87**	**0.113**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) PPM = Parts Per Million (v/v) On A Wet (Actual) Basis
(3) Lbs/Hr = Pounds of VOC Per Hour As Propane
(5) Lbs/Ton = Pounds of VOC Per Ton of Metal Processed. Calculated Using The Following Metal Process Rates: 15.79 Tons/Hr For SVPOUR1, 19.91 Tons/Hr For SVPOUR2, 15.62 Tons/Hr For SVPOUR3, and 16.98 Tons/Hr for SVPOUR4. Metal Process Rates Were Calculated Using Tons Of Metals Poured Data Supplied By CWC Textron.

II.4 TABLE 4
CARBON MONOXIDE (CO) EMISSION RESULTS
SVPOUR1-4
CWC TEXTRON
MUSKEGON, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	CO Concentration PPM (2)	CO Mass Rates	
						Lbs/Hr (3)	Lbs/Ton (4)
SVPOUR1	1	4/17/23	10:32-12:33	40,311	37.6	7.78	0.493
	2		13:34-14:38	40,258	37.2	7.67	0.486
	3		15:24-16:29	39,787	32.4	6.71	0.425
	Average			**40,119**	**35.7**	**7.39**	**0.468**
SVPOUR2	1	4/13/23	9:31-10:39	21,689	62.8	5.92	0.297
	2		11:23-12:33	21,079	81.2	7.44	0.374
	3		13:32-14:36	21,038	71.3	6.52	0.328
	Average			**21,269**	**71.8**	**6.63**	**0.333**
SVPOUR3	1	4/12/23	13:11-14:18	40,311	121.5	21.3	1.36
	2		15:08-17:08	40,258	94.3	16.51	1.06
	3		17:47-18:54	39,787	109.6	18.96	1.21
	Average			**40,119**	**108.5**	**18.92**	**1.21**
SVPOUR4	1	4/18/23	9:52-11:53	27,149	49.7	5.87	0.35
	2		12:29-13:32	27,243	59.3	7.02	0.41
	3		14:07-15:09	27,829	86.5	10.47	0.62
Average				**27,407**	**65.2**	**7.79**	**0.46**
AVERAGE					**70.3**	**10.18**	**0.618**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) PPM = Parts Per Million (v/v) On A Dry Basis
(3) Lbs/Hr = Pounds of CO Per Hour
(4) Lbs/Ton = Pounds of CO Per Ton of Metal Processed. Calculated using the following Metal Process Rates: 15.79 Pounds Per Ton For SVPOUR1, 19.91 Pounds Per Ton For SVPOUR2, 15.62 Pounds Per Ton For SVPOUR3 and 16.98 Pounds Per Ton For SVPOUR4. Metal Process Rates Were Calculated Using Tons Of Metals Poured Data Supplied By CWC Textron.

II.5 TABLE 5
OXIDES OF NITROGEN (NOx) EMISSION RESULTS
SVPOUR1-4
CWC TEXTRON
MUSKEGON, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	CO Concentration PPM (2)	CO Mass Rates	
						Lbs/Hr (3)	Lbs/Ton (4)
SVPOUR1	1	4/17/23	10:32-12:33	40,311	0.6	0.20	0.0129
	2		13:34-14:38	40,258	1.1	0.37	0.0236
	3		15:24-16:29	39,787	0.5	0.17	0.0108
	Average			**40,119**	**0.7**	**0.25**	**0.0158**
SVPOUR2	1	4/13/23	9:31-10:39	21,689	0.6	0.09	0.0047
	2		11:23-12:33	21,079	0.7	0.11	0.0053
	3		13:32-14:36	21,038	0.6	0.09	0.0045
	Average			**21,269**	**0.6**	**0.10**	**0.0048**
SVPOUR3	1	4/12/23	13:11-14:18	40,311	0.1	0.03	0.0018
	2		15:08-17:08	40,258	0.1	0.03	0.0018
	3		17:47-18:54	39,787	0.1	0.03	0.0018
	Average			**40,119**	**0.1**	**0.03**	**0.0018**
SVPOUR4		4/18/23	9:52-11:53	27,149	0.5	0.10	0.0057
			12:29-13:32	27,243	0.1	0.02	0.0011
			14:07-15:09	27,829	0.5	0.10	0.0059
	Average			**27,407**	**0.4**	**0.07**	**0.0042**
AVERAGE					**0.45**	**0.11**	**0.0067**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) PPM = Parts Per Million (v/v) On A Dry Basis
(3) Lbs/Hr = Pounds of CO Per Hour
(4) Lbs/Ton = Pounds of NOx Per Ton of Iron Poured. Calculated Using The Following Metal Process Rates: 15.79 Pounds Per Ton for SVPOUR1, 19.91 Pounds Per Ton For SVPOUR2, 15.62 Pounds Per Ton For SVPOUR3 and 16.98 Pounds Per Ton for SVPOUR4. Metal Process Rates Were Calculated Using Tons Of Metals Poured Data Supplied By CWC Textron.

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Tables 1 through 5 (Sections II.1.1 through II.1.5). The results are presented as follows:

III.1 SVPOUR 1-4 Exhausts Particulate Emissions (Table1)

- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration – Lbs/1000Lbs, Dry
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour
- Particulate Mass Emission Rate (Lbs/Ton Charged) – Pounds of Particulate Per Ton of Metal Charged

A more detailed breakdown for each sample can be found in Appendix A.

III.2 SVPOUR 1-4 PM-10/2.5 Emission Results (Table 2).

- **The condensable fraction was not used for the PM-10 and PM-2.5 calculations for stacks 1,3 and 4 because the stack exhaust temperatures did not exceed 85^{0}F per the method (EPA Reference Method 202).**
- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour
- Particulate Mass Emission Rate (Lbs/Ton Charged) – Pounds of Particulate Per Ton of Metal Charged

The condensable fraction was not used for the PM-10 and PM-2.5 calculations for stacks 1,3 and 4 because the stack exhaust temperatures did not exceed 85^{0}F per the method (EPA Reference Method 202).

A more detailed breakdown for each sample can be found in Appendix A.

III.3 SVPOUR 1-4 Exhausts Total VOC Emission Results (Table 3)

- Sample
- 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
- VOC Mass Emission Rate (Lbs/Ton of Charge) – Pounds of VOC Per Ton of Metal Charged

III.4 SVPOUR 1-4 Exhausts Carbon Monoxide (CO) Emission Results (Table 4)

- Sample
- 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
- CO Mass Emission Rate (Lbs/Ton of Charge) – Pounds of CO Per Ton of Metal Charged

III.5 SVPOUR 1-4 Exhausts Oxides of Nitrogen (NO_x) Emission Results (Table 5)

- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- NOx Concentration (PPM) – Parts Per Million (v/v) On A Dry Basis
- NOx Mass Emission Rate (Lbs/Hr) – Pounds of NOx Per Hour
- NOx Mass Emission Rate (Lbs/Ton of Charge) – Pounds of NOx Per Ton of Metal Charged

IV. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location for the pouring line exhausts were as follows:

SVPOUR1 and SVPOUR3

The testing location for these two sources were on the 72 inch I.D. diameter exhaust stacks with 2 sample ports that met the minimum location requirements of US EPA Reference Method 1. Straightening veins were installed to correct the flow for these exhausts. Twenty-four (24) sampling points were used for the isokinetic sampling on these sources. The points can be seen in Appendix H.

SVPOUR2 and SVPOUR4

The testing locations for these two sources were on the 42 inch I.D. diameter exhaust stacks with 2 sample ports that met the minimum location requirements of US EPA Reference Method 1. Straightening veins were installed to correct the flow for these exhausts. Twenty-four (24) sampling points were used for the isokinetic sampling on these sources. The points can be seen in Appendix H.

The emission sampling was conducted by employing the following reference methods:

- Particulate, PM-10 and 2.5 – U.S. EPA Methods 17 & 202
- Total Hydrocarbons (VOC's) – U.S. EPA Method 25A
- Carbon Monoxide (CO) – U.S. EPA Method 10
- Oxides of Nitrogen (NO_x) – U.S. EPA Method 7E
- Exhaust Gas Parameters (air flow, temperature, moisture & density) - U.S. EPA Methods 1-4

IV.1 Particulate, PM-10 and 2.5

The Particulate, PM-10 and 2.5 emission sampling was conducted in accordance with U.S. EPA Methods 17 and 202. Method 17 is an in-stack filtration method. Three (3) samples were collected from the cupola exhaust. 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 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. Figure 1 is a diagram of the Particulate, PM-10 and 2.5 sampling train.

The condensable fraction was not used for the PM-10 and PM-2.5 calculations for stacks 1,3 and 4 because the stack exhaust temperatures did not exceed 85^0F per the method (EPA Reference Method 202).

IV.2 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 exhaust through a heated teflon sample line 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. The analyzer was calibrated on the 0-500 PPM range for the testing. A span gase of 498.0 PPM was used to establish the initial instrument calibration. Calibration gases of 168.0 PPM & 251.0 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 251.0 PPM gas to determine the system bias. After each sample, a system zero and system injection of 251.0 PPM was 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 exhaust. 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 2.

IV.3 Total Hydrocarbons (VOC) – The VOC sampling was conducted in accordance with U.S. EPA Reference Method 25A. A Thermo Environmental Model 51 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 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 50.6 PPM Propane was 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 the source. 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 exhaust. 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 3 is a diagram of the VOC sampling train.

IV.4 Oxides of Nitrogen (NO_x) - The Oxides of Nitrogen (NO_x) emission sampling was conducted in accordance with U.S. EPA Reference Method 7E. The sample gas was extracted from the exhaust through a heated teflon sample line which led to a VIA MAK 2 sample gas conditioner and then to a Thermo Environmental Model 42H NOx stack gas monitor. This analyzer is capable of giving instantaneous readouts of the NO_x concentrations (PPM). Three (3) samples were collected from the exhaust sampled. Each sample was sixty (60) minutes in duration.

The analyzer was calibrated with EPA protocol NO_x calibration gases. The analyzer was calibrated on the 0-50 PPM range for these sources. A span gas of 25.10 PPM was used to establish the initial instrument calibration. A. calibration gas of 12.20 PPM was 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 12.20 PPM gas to determine the system bias. After each sample, a system zero and system injection of 12.20 PPM was 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 exhaust. 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 2.

IV.5 Oxygen & Carbon Dioxide – The O_2 & CO_2 concentrations were determined by orsat . Integrated bags were pulled during each test

IV.6 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.

This report was prepared by:

R. Scott Cargill
Project Manager

This report was reviewed by:

David D. Engelhardt
Vice President

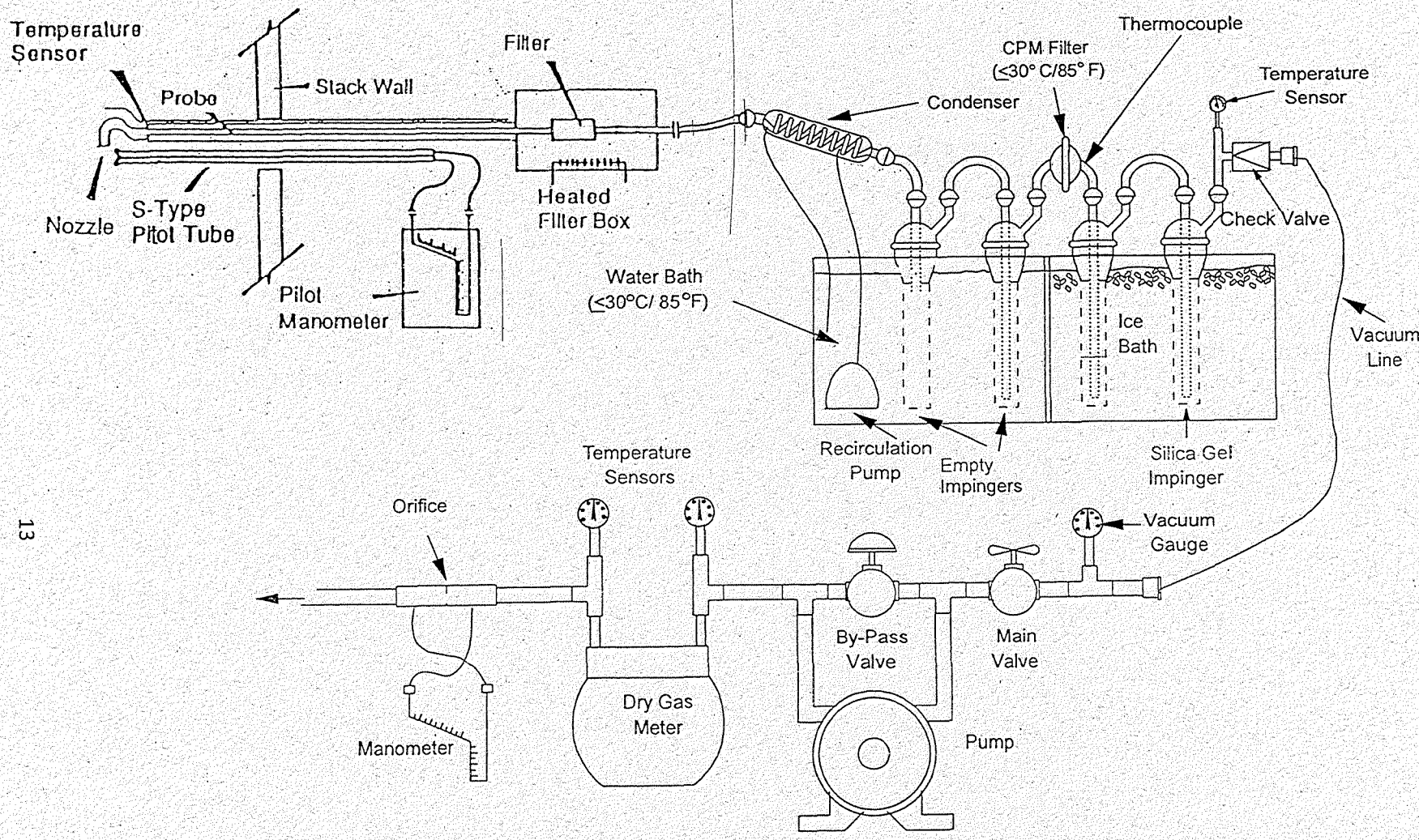

Figure 1

Particulate Sampling Train

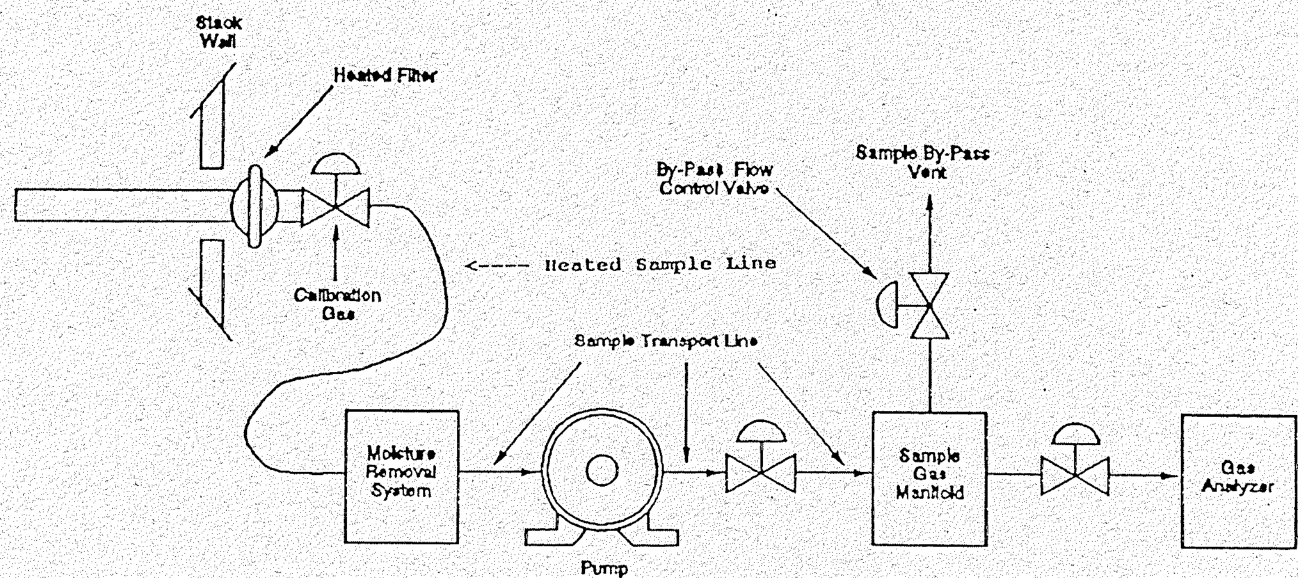

Figure 2

NOx and CO Sampling Train

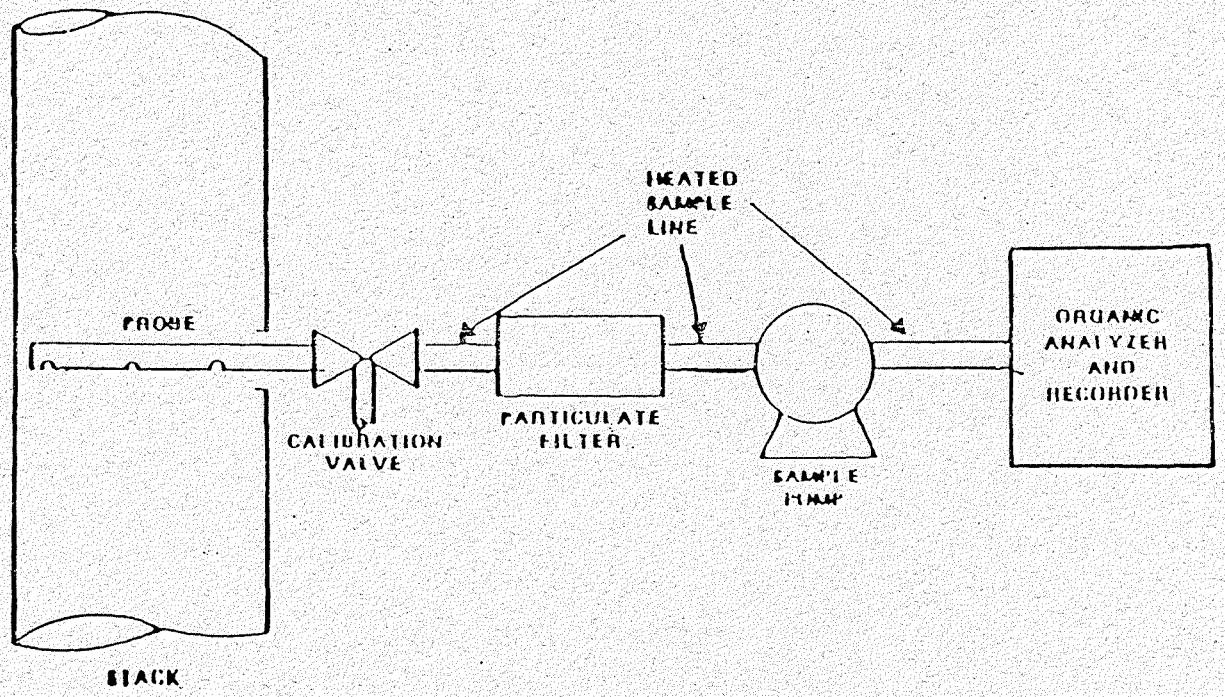

Figure 3

Total VOC Sampling Train