

**I. INTRODUCTION**

Network Environmental, Inc. was retained by Lacks Industries to perform compliance emission sampling on multiple sources located at their Barden Avenue facility in Kentwood, Michigan. 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 MI-ROP-N2079-2017

The following is a list of the sources, applicable emission limits and the compounds tested:

Stack ID	Emission Limits	Compound Sampled
SVK2	Total Cr: 0.0025 Lbs/Hr and 0.012 Mg/M <sup>3</sup>	Total Chromium
SVK4	Formaldehyde: 2.97 Lbs/Hr Methanol: 12.2 Lbs/Hr	Methanol, Formaldehyde
SVK6	Nickel: 0.028 Lbs/Hr	Nickel
SVK7	Nickel: 0.028 Lbs/Hr	Nickel
SVK8	Total Cr: 0.0006 Lbs/Hr and 0.005 Mg/M <sup>3</sup>	Total Chromium

The sampling was performed by Stephan K. Byrd, R. Scott Cargill, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. over the period of April 12-15, 2021. Assisting in the study was Ms. Karen Baweja of Lacks Industries and the operating staff of the facility. Ms. April Lazzaro, and Mr. Matt Karl of EGLE, Air Quality Division were present to observe the testing and source operation.

The following test methods were used to conduct the testing:

Nickel – U.S. EPA Reference Method 29

Formaldehyde – U.S. EPA Method SW-846 Method 0011

Total Chrome – U.S. EPA Reference Method 306

Methanol – U.S. EPA Reference Method 308

**II. PRESENTATION OF RESULTS**

**II.1 TABLE 1  
NICKEL EMISSION RESULTS  
SVK6 & SVK7 EXHAUSTS  
BARDEN FACILITY  
KENTWOOD, MICHIGAN  
APRIL 14, 2021**

SVK7 Sample #	Time	Air Flow Rate DSCFM	Concentration Mg/M <sup>3</sup>	Mass Emission Rate Lbs/Hr
1	8:41-9:52	22,350	0.0268	0.0022
2	10:27-11:33	22,267	0.0294	0.0025
3	12:14-13:20	21,833	0.1087	0.0089
<b>Average</b>		<b>22,150</b>	<b>0.0550</b>	<b>0.0045</b>
SVK6 Sample #				
4	8:32-9:38	32,338	0.0181	0.0022
5	10:25-11:31	31,389	0.0263	0.0031
6	12:16-13:21	31,550	0.0201	0.0024
<b>Average</b>		<b>31,759</b>	<b>0.0215</b>	<b>0.0026</b>

**II.2 TABLE 2  
 FORMALDEHYDE EMISSION RESULTS  
 ELECTROLESS COPPPER (SVK-4) EXHAUST  
 BARDEN FACILITY  
 KENTWOOD, MICHIGAN  
 APRIL 15, 2021**

Source	Date	Sample #	Time	Air Flow Rate DSCFM	Mass Emission Rate Lbs/Hr
Electroless Copper (SVK4)	4/15/21	1	9:07-10:07	31,199	0.0249
		2	10:19-11:19	31,492	0.0232
		3	11:41-12:41	31,164	0.0517
<b>Average</b>				<b>31,285</b>	<b>0.0333</b>

**II.3 TABLE 3  
METHANOL EMISSION RESULTS  
ELECTROLESS COPPER (SVK4) EXHAUST  
BARDEN FACILITY  
KENTWOOD, MICHIGAN  
APRIL 15, 2021**

Sample	Time	Air Flow Rate DSCFM	Concentration Mg/M <sup>3</sup>	Mass Emission Rate Lbs/Hr
1	9:07-10:07	31,199	54.32	6.35
2	10:19-11:19	31,492	53.79	6.34
3	11:41-12:41	31,164	58.06	6.77
<b>Average</b>		<b>31,285</b>	<b>55.39</b>	<b>6.49</b>

**II.4 TABLE 4  
TOTAL CHROME EMISSION RESULTS  
CHROME PLATE (SVK-8) EXHAUST & CHROME ETCH (SVK-2) EXHAUST  
BARDEN FACILITY  
KENTWOOD, MICHIGAN  
APRIL 13, 2021**

Source	Sample	Time	Air Flow Rate DSCFM	Concentration Mg/M <sup>3</sup>	Mass Emission Rate Lbs/Hr
Chrome Plate SVK-8	1	8:00-10:04	29,633	0.0063	0.0007
	2	10:21-12:28	29,926	0.0057	0.0006
	3	12:47-15:40	30,232	0.0047	0.0005
<b>Average</b>			<b>29,930</b>	<b>0.0056</b>	<b>0.0006</b>
Chrome Etch SVK-2	1	7:00-9:04	54,550	0.0387	0.0079
	2	9:31-11:35	53,873	0.0551	0.0111
	3	11:56-14:00	54,363	0.0219	0.0045
<b>Average</b>			<b>54,262</b>	<b>0.0386</b>	<b>0.0078</b>

### **III. DISCUSSION OF RESULTS**

The emission results are presented in Tables 1 through 4 (Section II.1 through II.4).

### **IV. SAMPLING AND ANALYTICAL PROTOCOL**

All of the sampling locations met the minimum requirements of U.S. EPA Reference 1. All exhaust stack dimensions and all of the point locations can be seen in Appendix F. Twenty-four points (twelve per port) were used for all of the isokinetic sampling.

**IV.1 Nickel** - The nickel emission sampling was conducted in accordance with U.S. EPA Method 29 (multiple metals train). Figure 1 is a schematic diagram of the Method 29 sampling train. Each sample was sixty (60) minutes in duration and had a minimum sample volume of thirty (30) dry standard cubic feet. The samples were collected isokinetically on quartz filters, and in a nitric acid/hydrogen peroxide solution.

The samples were recovered and refrigerated until they were analyzed. The filters and nozzle/probe rinses (front half) were combined with the impinger catch of nitric acid/hydrogen peroxide solution and were analyzed for nickel by Inductively Coupled Argon Plasma (ICAP)/Mass Spectrometer (MS). All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

**IV.2 Methanol** - The methanol determinations were performed in accordance with EPA Method 308. Teflon probes were used to extract the exhaust gas from the exhausts. Silica Gel sorbent tubes were used to collect the methanol. The sampling trains were operated with vacuum pumps with calibrated critical orifices. Three midget impingers were used ahead of the tubes. The first two impingers contained approximately 15mls of DI water and the third impinger was empty. One sample spike was run for each compound. The spike consisted of a liquid spike and a tube spike. The orifices were calibrated at approximately 1000 cc/min. Three (3), sixty (60), minute samples were collected from the exhaust for the compound. Figure 2 is a schematic diagram of the Methanol sampling train.

The silica gel tubes and impinger contents were recovered and refrigerated until analyzed. The tubes were desorbed and the impinger contents and tubes were analyzed by GC/FID in accordance with the method for methanol. All quality assurance and quality control requirements specified in the method were incorporated in the sampling and analysis. In addition, a spiked duplicate train was run during one of the samples to document recovery efficiency for the compound. Methanol recovery was 84.19%.

**IV.3 Formaldehyde** - The formaldehyde sampling was performed in accordance with Method 0011. Method 0011 was modified to use midjet impingers and sample at a constant rate. Samples were extracted from the exhaust of the Electroless Copper (SVK-4) exhaust at approximately 1000 cc/per minute through a Teflon sample line and then through midjet impingers with 15 mls of DNPH solution in each of the first two (2) impingers. The sampling system used a sampling pump equipped with a calibrated critical orifice. Figure 3 is a schematic diagram of the formaldehyde sampling train.

The samples were analyzed by HPLC. All the applicable quality assurance and quality control procedures listed in the method were incorporated in the sampling and analysis. In addition, a spiked duplicate train was run during one of the samples to document recovery efficiency for formaldehyde. Formaldehyde recovery was 93.82%.

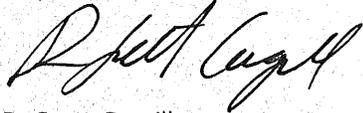
**IV.4 Total Chrome** - The Cr emission sampling was conducted in accordance with U.S. EPA Method 306. Three (3) samples, 120 minutes in duration each, were collected from the exhausts. The samples were collected isokinetically in 0.1N Sodium Bicarbonate as outlined in the method.

The samples were recovered and analyzed for total chromium by inductively coupled argon plasma/mass spectrophotometry (ICP/MS). All the quality assurance and quality control procedures listed in the method were incorporated in the sampling and analysis. Figure 4 is a schematic diagram of the total chrome sampling train.

**IV.5 Exhaust Gas Parameters** - The exhaust gas parameters (air flow rate, temperature, moisture, and density) were determined by employing U.S. EPA Reference Methods 1 through 4.

All the quality control and quality assurance requirements listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:

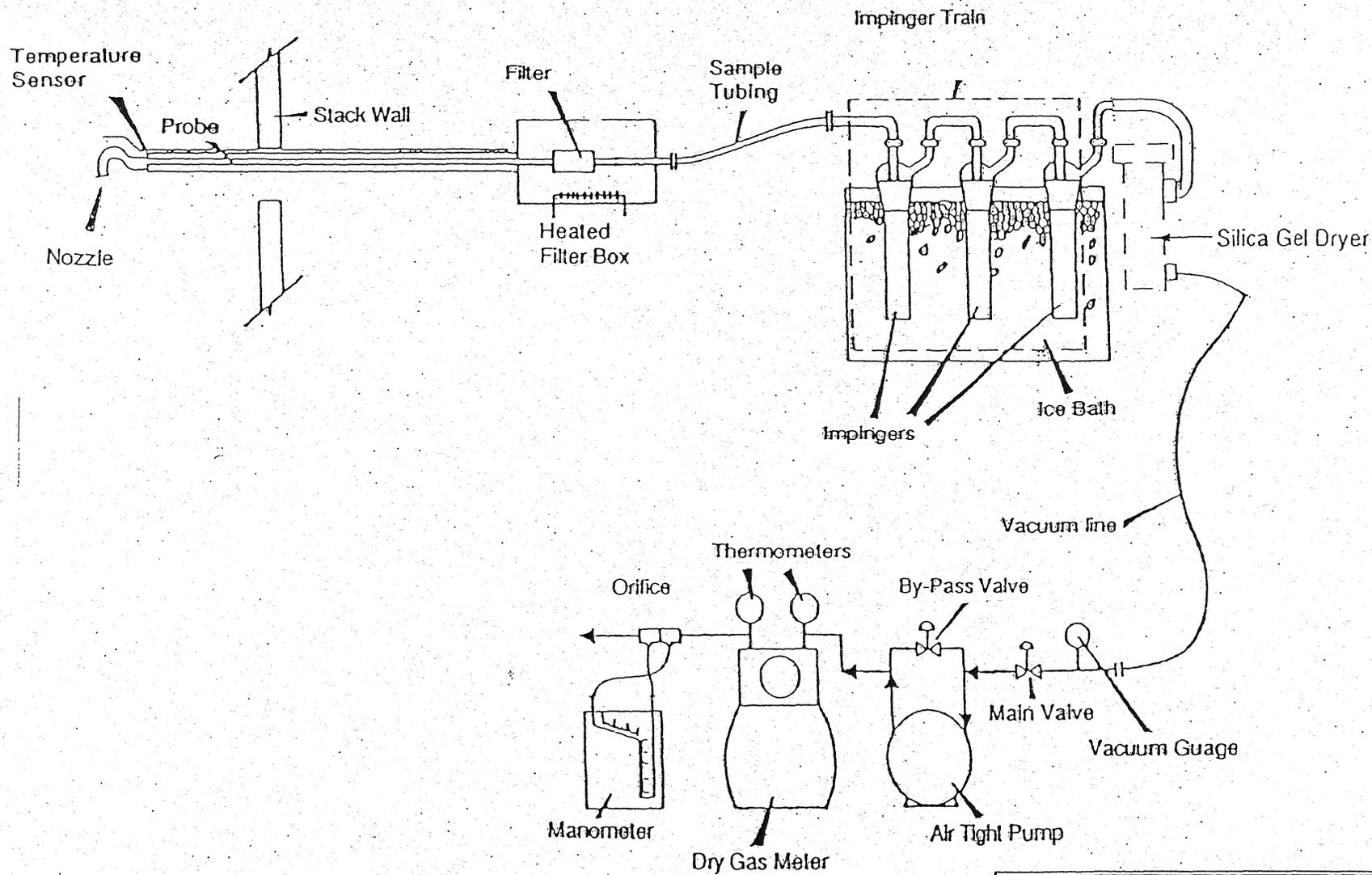


R. Scott Cargill  
Project Manager

This report was reviewed by:



David D. Engelhardt  
Vice President



**FIGURE 1**  
**EPA METHOD 29**  
**MULTIPLE METALS TRAIN**

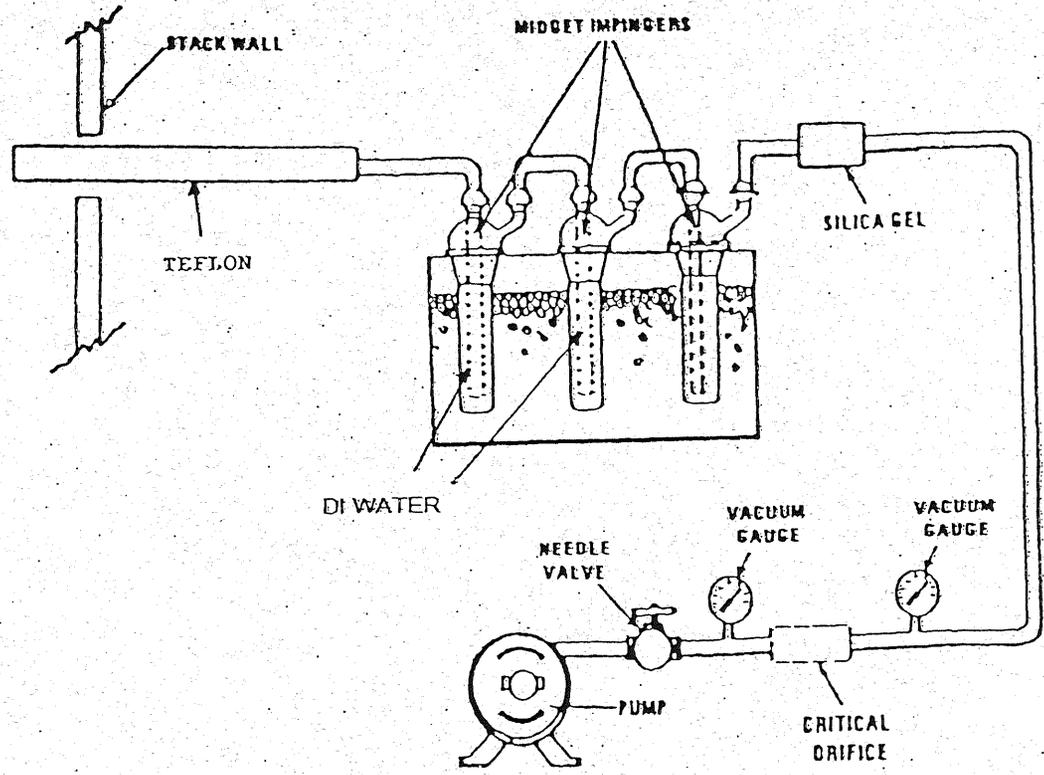


FIGURE 2  
METHANOL SAMPLING TRAIN

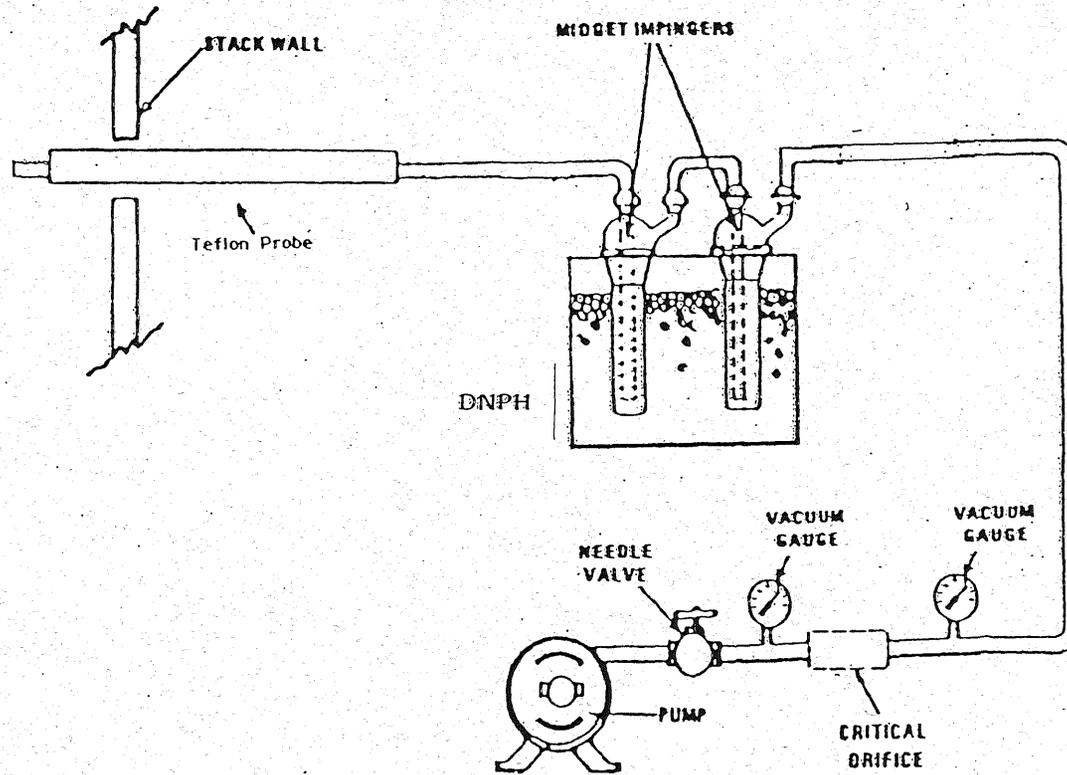


FIGURE 3  
FORMALDEHYDE SAMPLING TRAIN

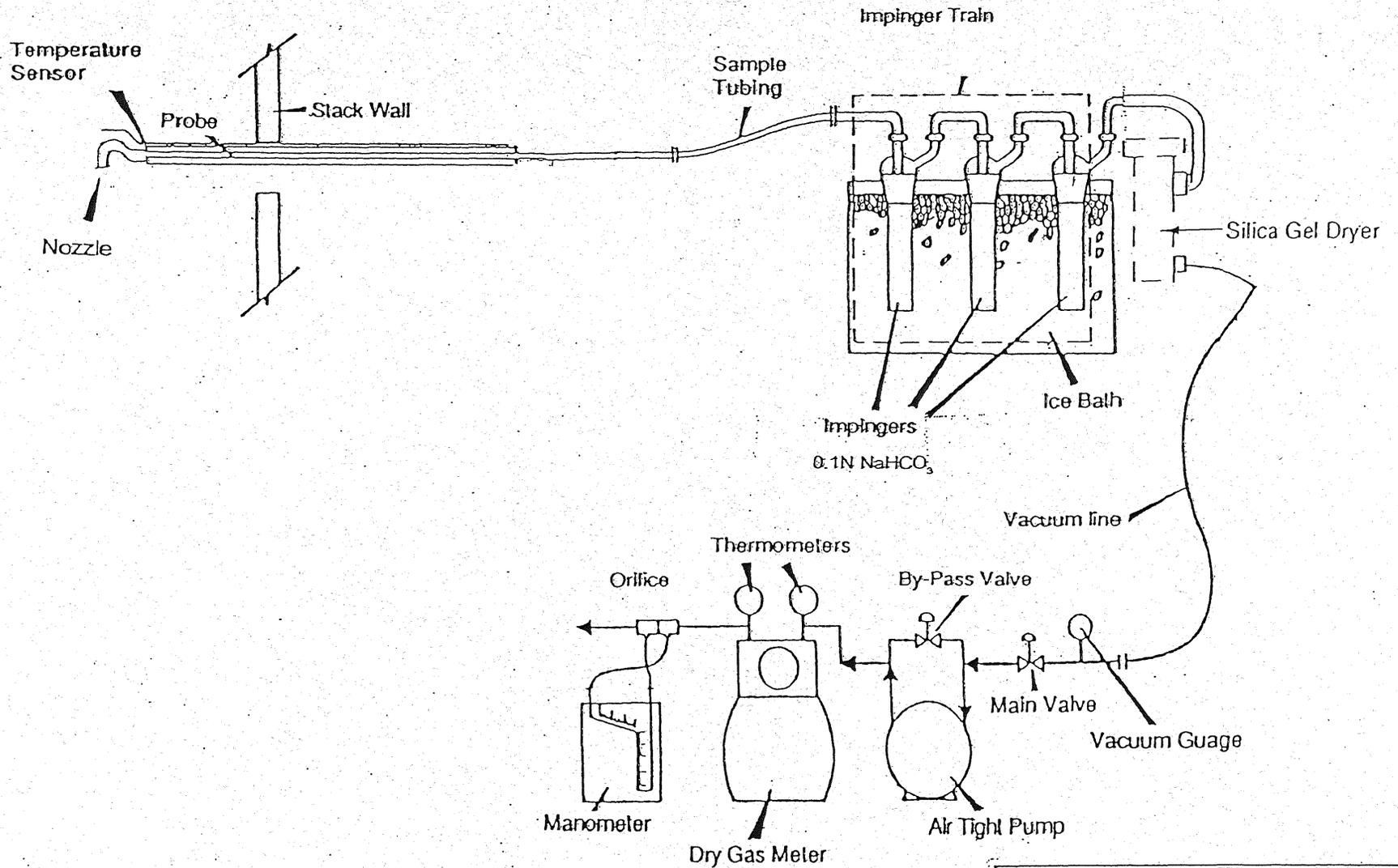


FIGURE 4  
TOTAL CHROME SAMPLING TRAIN