Report of...

Compliance Emission Testing

Performed for the...

Franklin Metals Trading Company
Lake Odessa, Michigan

On the...

Sweat Furnace Exhaust
(EUFURNACE)

April 9-11, 2024

Project#: 169.16

Performed By:

Network Environmental, Inc.
Grand Rapids, MI

Performed for:

Franklin Metals Trading Company
609 Tupper Lake Road
Lake Odessa, MI 48849
Contact: Eric McKeever
Telephone: (616) 374-7171
Cell: (616) 419-9000
E-mail: emckeever@franklinmetals.com

Performed by:

Network Environmental, Inc.
2629 Remico Street, Suite B
Grand Rapids, MI 49519
Contact: David D. Engelhardt
Telephone: (616) 530-6330
Fax: (616) 530-0001
E-mail: netenviro@aol.com

TABLE OF CONTENTS

Appendices

I. INTRODUCTION

Network Environmental, Inc. was retained by the Franklin Metals Trading Company (SRN: N2199 - Ionia County) to conduct a compliance emission study on the sweat furnace (EUFURNACE) at their facility. The purpose of the study was to meet the emission testing requirements of Permit to Install (PTI) No. 447-89B and 40 CFR, Part 63, Subpart RRR.

The following is a list of the applicable emission limits for the furnace exhaust:

Emission Limit(s)
Copper (Cu): 0.14 Lbs/Hr
Cobalt (Co): 0.014 Lbs/Hr
Nickel (Ni): 0.0048 Lbs/Hr
Dioxins & Furans: 0.80 ng TEQ/M^3 @ 11% O_2
Hydrochloric Acid (HCl): 5.94 Lbs/Hr
Hydrofluoric Acid (HF): 5.94 Lbs/Hr

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

- Metals – U.S. EPA Method 29
- Dioxins & Furans – U.S. EPA Method 23
- HCl & HF – U.S. EPA Method 26A
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Methods 1- 4

The sampling was performed over the period of April 9-11, 2024 by Stephan K. Byrd, R. Scott Cargill, Richard D. Eerdmans, and David D. Engelhardt of Network Environmental, Inc.. Assisting with the study were Mr. Eric McKeever of the Franklin Metals Trading Company, Mr. Bruce Bergeson of Bergeson Technology Services LLC and the operating staff of the facility. Mr. Clayton DeRonne, Mr. Daniel Droste and Mr. Eric Grinstern of the Michigan Department of Environment, Great Lakes and Energy (EGLE) - Air Quality Division were present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
COPPER (Cu) EMISSION RESULTS
FURNACE BAGHOUSE EXHAUST
FRANKLIN METALS
LAKE ODESSA, MI

Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration	Cu Mass Emission Rates	
				ug/M^3 (2)	Lbs/Hr (3)	Lbs/Ton (4)
1	4/11/24	08:25-09:30	38,372	23.83	0.0034	0.0020
2	4/11/24	10:15-11:37	38,362	23.91	0.0034	0.0018
3	4/11/24	12:15-13:20	38,161	16.17	0.0023	0.0012
Average			**38,298**	**21.30**	**0.0031**	**0.0017**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F and 29.92 in. Hg)
(2) ug/M^3 = Micrograms Per Dry Standard Cubic Meter
(3) Lbs/Hr = Pounds Per Hour
(4) Lbs/Ton = Pounds Per Ton Of Metal Melted (Sample 1 = 1.76 Tons/Hr, Sample 2 = 1.90 Tons/Hr & Sample 3 = 1.95 Tons/Hr)
(5) Emission Limit = 0.14 Lbs/Hr

II.2 TABLE 2
COBALT (Co) EMISSION RESULTS
FURNACE BAGHOUSE EXHAUST
FRANKLIN METALS
LAKE ODESSA, MI

Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration	Co Mass Emission Rates	
				ug/M^3 (2)	Lbs/Hr (3)	Lbs/Ton (4)
1	4/11/24	08:25-09:30	38,372	0.289	0.000042	0.000024
2	4/11/24	10:15-11:37	38,362	0.220	0.000032	0.000017
3	4/11/24	12:15-13:20	38,161	N.D.(5)	N.D.(5)	N.D.(5)
Average			**38,298**	**0.226**	**0.000033**	**0.000018**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F and 29.92 in. Hg)
(2) ug/M^3 = Micrograms Per Dry Standard Cubic Meter
(3) Lbs/Hr = Pounds Per Hour
(4) Lbs/Ton = Pounds Per Ton Of Metal Melted (Sample 1 = 1.76 Tons/Hr, Sample 2 = 1.90 Tons/Hr & Sample 3 = 1.95 Tons/Hr)
(5) N.D. = Non Detected At Dection Limits of 0.170 ug/M^3, 0.000024 Lbs/Hr and 0.000013 Lbs/Ton. The averages were calculated using the detection limit values for Sample 3.
(6) Emission Limit = 0.014 Lbs/Hr

II.3 TABLE 3
NICKEL (Ni) EMISSION RESULTS
FURNACE BAGHOUSE EXHAUST
FRANKLIN METALS
LAKE ODESSA, MI

Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration	Ni Mass Emission Rates	
				ug/M^3 (2)	Lbs/Hr (3)	Lbs/Ton (4)
1	4/11/24	08:25-09:30	38,372	4.18	0.00060	0.00034
2	4/11/24	10:15-11:37	38,362	4.34	0.00062	0.00033
3	4/11/24	12:15-13:20	38,161	3.03	0.00043	0.00022
Average			**38,298**	**3.85**	**0.00055**	**0.00030**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 ºF and 29.92 in. Hg)
(2) ug/M^3 = Micrograms Per Dry Standard Cubic Meter
(3) Lbs/Hr = Pounds Per Hour
(4) Lbs/Ton = Pounds Per Ton Of Metal Melted (Sample 1 = 1.76 Tons/Hr, Sample 2 = 1.90 Tons/Hr & Sample 3 = 1.95 Tons/Hr)
(5) Emission Limit = 0.0048 Lbs/Hr

II.4 TABLE 4
TOTAL DIOXIN & FURAN(1) EMISSION RESULTS
FURNACE BAGHOUSE EXHAUST
FRANKLIN METALS
LAKE ODESSA, MI

Sample	Date	Time	Air Flow Rate DSCFM (2)	Concentration	TCDD/TCDF Mass Emission Rates	
				ng/M3 (3)	Lbs/Hr (4)	Lbs/Ton (5)
1	4/9/24	08:40-12:05	41,158	0.441	6.80E-08	3.54E-08
2	4/9/24	13:20-16:30	41,198	0.243	3.74E-08	1.84E-08
3	4/10/24	08:25-11:35	39,468	0.288	4.26E-08	2.07E-08
Average			**40,608**	**0.324**	**4.93E-08**	**2.48E-08**

(1) Compounds listed are the 2,3,7,8 cogeners of TCDDs/TCDFs with Toxic Equivalent Factors (TEFs) greater than zero. Where the compounds were non detected, the detection limit value was used in the calculation.
(2) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F and 29.92 in. Hg)
(3) ng/M^3 = Nanograms Per Dry Standard Cubic Meter
(4) Lbs/Hr = Pounds Per Hour
(5) Lbs/Ton = Pounds Per Ton Of Metal Melted (Sample 1 = 1.92 Tons/Hr, Sample 2 = 2.03 Tons/Hr & Sample 3 = 2.06 Tons/Hr)
(6) Emission Limit = 0.80 ng/M^3 @ 11% O_2

II.5 TABLE 5
HYDROCHLORIC ACID (HCl) EMISSION RESULTS
FURNACE BAGHOUSE EXHAUST
FRANKLIN METALS
LAKE ODESSA, MI

Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration	HCl Mass Emission Rates	
				ug/M^3 (2)	Lbs/Hr (3)	Lbs/Ton (4)
1	4/10/24	13:10-14:15	39,033	3,053.57	0.446	0.199
2	4/10/24	14:35-15:40	38,113	1,293.68	0.185	0.088
3	4/10/24	15:55-17:00	38,067	6,162.38	0.878	0.470
Average			**38,405**	**3,503.21**	**0.503**	**0.252**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F and 29.92 in. Hg)
(2) ug/M^3 = Micrograms Per Dry Standard Cubic Meter
(3) Lbs/Hr = Pounds Per Hour
(4) Lbs/Ton = Pounds Per Ton Of Metal Melted (Sample 1 = 2.24 Tons/Hr, Sample 2 = 2.10 Tons/Hr & Sample 3 = 1.87 Tons/Hr)
(5) Emission Limit = 5.94 Lbs/Hr

II.6 TABLE 6
HYDROFLUORIC ACID (HF) EMISSION RESULTS
FURNACE BAGHOUSE EXHAUST
FRANKLIN METALS
LAKE ODESSA, MI

Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration	HF Mass Emission Rates	
				ug/M3 (2)	Lbs/Hr (3)	Lbs/Ton (4)
1	4/10/24	13:10-14:15	39,033	40.68	0.0059	0.0027
2	4/10/24	14:35-15:40	38,113	38.26	0.0055	0.0026
3	4/10/24	15:55-17:00	38,067	101.23	0.0144	0.0077
Average			**38,405**	**60.06**	**0.0086**	**0.0043**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F and 29.92 in. Hg)
(2) ug/M3 = Micrograms Per Dry Standard Cubic Meter
(3) Lbs/Hr = Pounds Per Hour
(4) Lbs/Ton = Pounds Per Ton Of Metal Melted (Sample 1 = 2.24 Tons/Hr, Sample 2 = 2.10 Tons/Hr & Sample 3 = 1.87 Tons/Hr)
(5) Emission Limit = 5.94 Lbs/Hr

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Tables 1 through 6 (Sections II.1 through II.6). The results are presented as follows:

III.1 Copper (Cu) Emission Results (Table 1)

Table 1 summarizes the Cu emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) - Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Cu Concentration (ug/M^3) - Micrograms of Cu Per Dry Standard Cubic Meter
- Cu Mass Emission Rates:
  - ✧ Lbs/Hr - Pounds of Cu Per Hour
  - ✧ Lbs/Ton - Pounds of Cu Per Ton Of Metal Melted (Metal Melted During Each Sample Was: Sample 1 = 1.76 Tons/Hr, Sample 2 = 1.90 Tons/Hr & Sample 3 = 1.95 Tons/Hr)

III.2 Cobalt (Co) Emission Results (Table 2)

Table 2 summarizes the Co results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) - Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Co Concentration (ug/M^3) - Micrograms of Co Per Dry Standard Cubic Meter
- Co Mass Emission Rates:
  - ✧ Lbs/Hr - Pounds of Co Per Hour
  - ✧ Lbs/Ton - Pounds of Co Per Ton Of Metal Melted (Metal Melted During Each Sample Was: Sample 1 = 1.76 Tons/Hr, Sample 2 = 1.90 Tons/Hr & Sample 3 = 1.95 Tons/Hr)

III.3 Nickel (Ni) Emission Results (Table 3)

Table 3 summarizes the Ni results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) - Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Ni Concentration (ug/M^3) - Micrograms of Ni Per Dry Standard Cubic Meter

- Ni Mass Emission Rates:
  - ✧ Lbs/Hr - Pounds of Ni Per Hour
  - ✧ Lbs/Ton - Pounds of Ni Per Ton Of Metal Melted (Metal Melted During Each Sample Was: Sample 1 = 1.76 Tons/Hr, Sample 2 = 1.90 Tons/Hr & Sample 3 = 1.95 Tons/Hr)

III.4 Total Dioxins & Furans Emission Results (Table 4)

Table 4 summarizes the total dioxins & furans emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) - Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Total Dioxins & Furans Concentration (ng/M^3) - Nanograms of Dioxins & Furans Per Dry Standard Cubic Meter
- Total Dioxins & Furans Mass Emission Rate:
  - ✧ Lbs/Hr - Pounds of Dioxins & Furans Per Hour
  - ✧ Lbs/Ton - Pounds of Dioxins & Furans Per Ton Of Metal Melted (Metal Melted During Each Sample Was: Sample 1 = 1.92 Tons/Hr, Sample 2 = 2.03 Tons/Hr & Sample 3 = 2.06 Tons/Hr)

The total dioxins & furans results consist of the 2,3,7,8 cogeners of TCDDs/TCDFs with Toxic Equivalent Factors (TEFs) greater than zero. Whenever a compound was non detected, the detection limit value was used in the calculations.

III.5 Hydrochloric Acid (HCl) Emission Results (Table 5)

Table 5 summarizes the HCl emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) - Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- HCl Concentration (ug/M^3) - Micrograms of HCl Per Dry Standard Cubic Meter
- HCl Mass Emission Rates:
  - ✧ Lbs/Hr - Pounds of HCl Per Hour
  - ✧ Lbs/Ton - Pounds of HCl Per Ton Of Metal Melted (Metal Melted During Each Sample Was: Sample 1 = 2.24 Tons/Hr, Sample 2 = 2.10 Tons/Hr & Sample 3 = 1.87 Tons/Hr)

III.6 Hydrofluoric Acid (HF) Emission Results (Table 6)

Table 6 summarizes the HF emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) - Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- HF Concentration (ug/M^3) - Micrograms of HF Per Dry Standard Cubic Meter
- HF Mass Emission Rates:
  - ✧ Lbs/Hr - Pounds of HF Per Hour
  - ✧ Lbs/Ton - Pounds of HF Per Ton Of Metal Melted (Metal Melted During Each Sample Was: Sample 1 = 2.24 Tons/Hr, Sample 2 = 2.10 Tons/Hr & Sample 3 = 1.87 Tons/Hr)

IV. SOURCE DESCRIPTION

The source tested is a gas-fired sweat furnace with melt and holding chambers. The furnace is equipped with two 3.4 MMBTU/Hr burners in the melt chamber and one 3.4 MMBTU/Hr burner in the holding chamber. The holding capacity is 32,000 pounds. Emissions are controlled by an afterburner, spark arrestor and lime coated baghouse. The furnace also has a recirculating pump and a small sidewell for any extra scrap charging (mostly aluminum turnings) and improved melting efficiency. These emissions are captured and controlled through the lime baghouse.

V. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location for the baghouse exhaust was on the 60 inch diameter exhaust at a location 3 duct diameters downstream and 1.5 duct diameters upstream from the nearest disturbances. There are 2 sample ports. Twenty-Four (24) sampling points (12 per port) were used for the isokinetic sampling. Prior to the sampling, a preliminary cyclonic/turbulent flow check was conducted. The results showed no cyclonic or turbulent flow. The sampling point dimensions were as follows:

Sample Point	Dimension (Inches)
1	1.26
2	4.02
3	7.08
4	10.62
5	15.00
6	21.36
7	38.64

8	45.00
9	49.38
10	52.92
11	55.98
12	58.74

V.1 Metals – The metals (Cu, Co & Ni) emission sampling was conducted by employing U.S. EPA Method 29. This is an out of stack filtration method, where the sampling probe and filter are heated at 248 °F (plus or minus 25 °F). Three (3) samples were collected. Each sample was sixty (60) minutes in duration.

The samples were collected isokinetically on quartz filters, and in a nitric acid/hydrogen peroxide solution solution. The nozzle/probe rinses, filters and nitric acid/hydrogen peroxide solutions were analyzed for all the above listed metals by inductively coupled argon plasma/mass spectrophotometry (ICAP/MS) analysis in accordance with Method 29. All the quality assurance and quality control procedures listed in the method were incorporated in the sampling and analysis. Figure 1 is a diagram of the metals sampling train.

V.2 Dioxins & Furans – The PCDD's/PCDF's (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans: 2,3,7,8 substituted cogeners from the Tetra through Octa homologs) emission sampling was performed in accordance with U.S. EPA Method 23. A Modified Method 5 (MM5) sampling train, as described in Method 23, was used to collect the samples. The sampling train consisted of a heated glass lined probe followed by a heated pre-cleaned quartz filter. A condenser coil followed by an XAD sorbent trap followed the heated filter. The probe and filter were heated at 248 °F (plus or minus 25 °F). All sampling train components were pre-cleaned in accordance with the method.

Three (3) samples were collected. Each sample was one hundred eighty (180) minutes in duration. The sampling system operation was consistent with U.S. EPA Method 5. The three samples and the blank train were recovered in pre-cleaned sample bottles with Teflon lined caps. The probe rinse and filter rinse were combined with the XAD extract for analysis. The analytes were extracted from the sample, separated by high resolution gas chromatography, and measured by high resolution mass spectrometry. The analysis followed the procedures of SW-846 Method 8290. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis. Figure 2 is a diagram of the Method 23 sampling train.

IV.3 HCl & HF – The HCl and HF emission sampling was conducted in accordance with U.S. EPA Method 26A. Three (3) samples were collected. Each sample was sixty (60) minutes in duration.

The sampling was performed isokinetically in accordance with the method. The HCL and HF were collected in the first two impingers of the sampling train, which contained 100 mls of 0.1 normal sulfuric acid. The probe rinse and the impinger catch were combined and analyzed for HCL and HF using Ion-chromatography as described in the method.

All the quality assurance and quality control requirements specified in the method were incorporated in the sampling and analysis. A diagram of the sampling train is shown in Figure 3.

IV.4 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, moistures and densities were determined using the isokinetic sampling trains. Integrated bag samples were collected from the back of the isokinetic sampling trains and analyzed for O_2 and CO_2 content by Orsat analysis. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:

David D. Engelhardt
Vice President

This report was reviewed by:

R. Scott Cargill
Project Manager

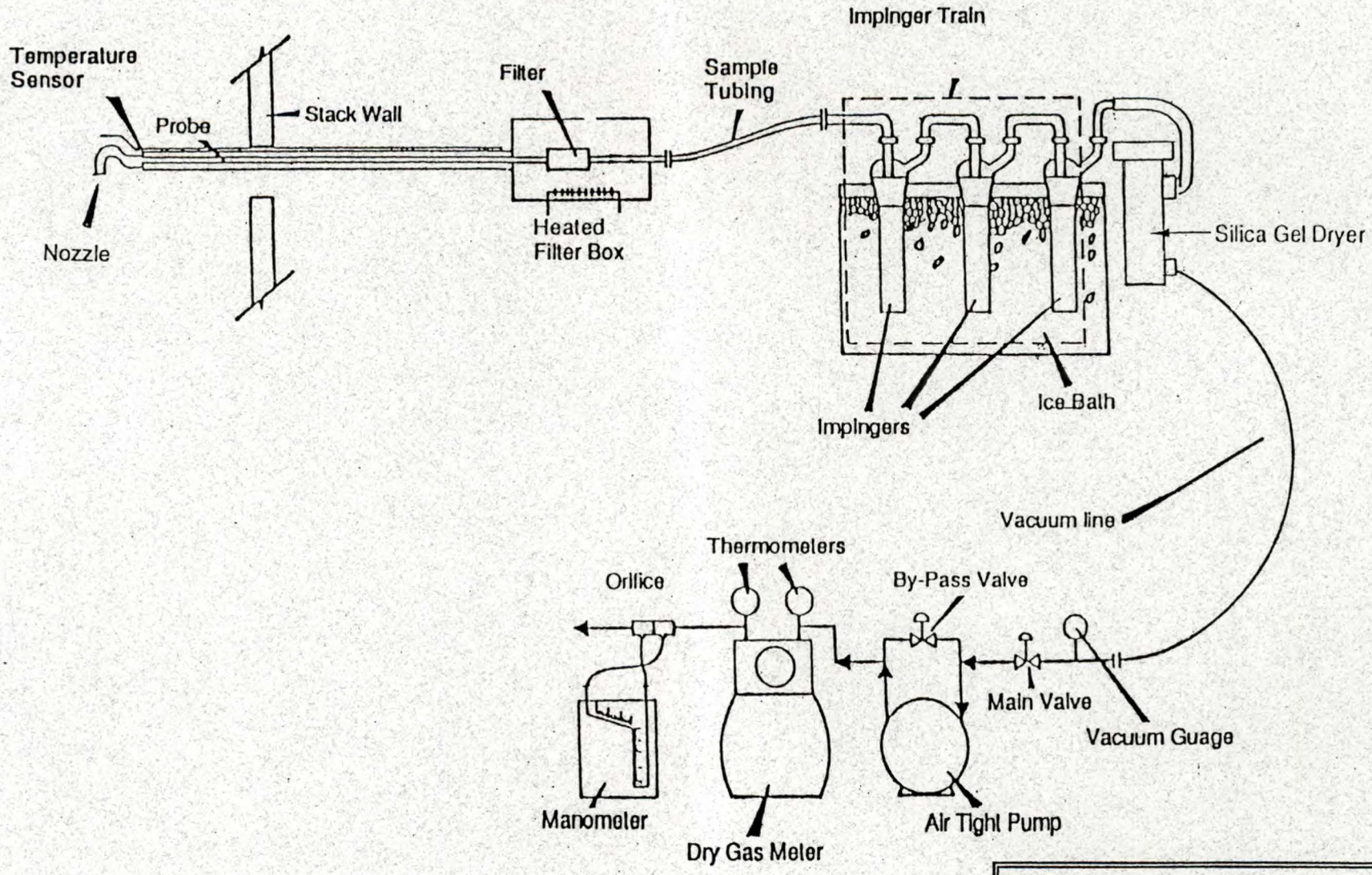

Figure 1

Metals Sampling Train

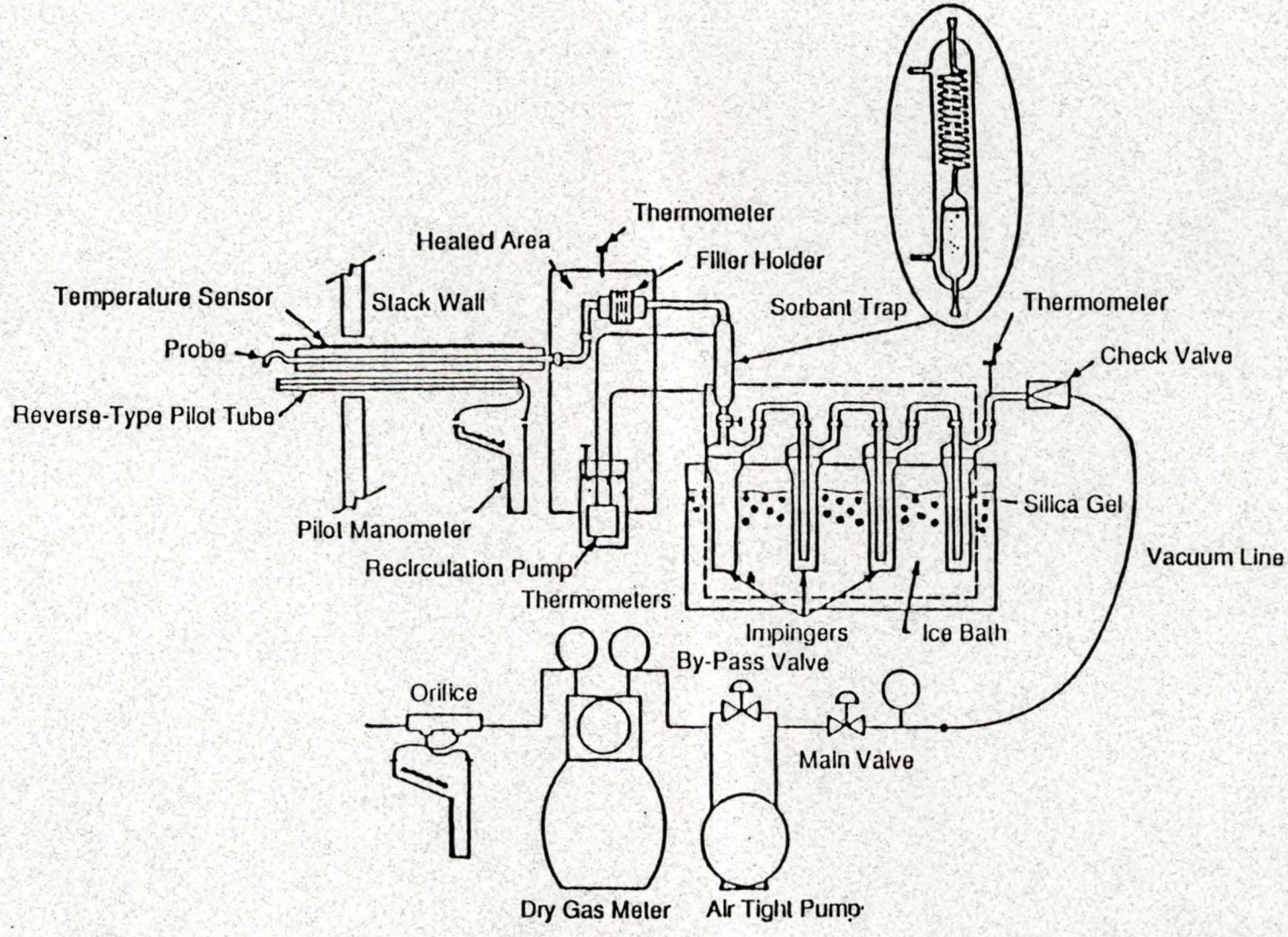

Figure 2

Dioxin & Furan Sampling Train

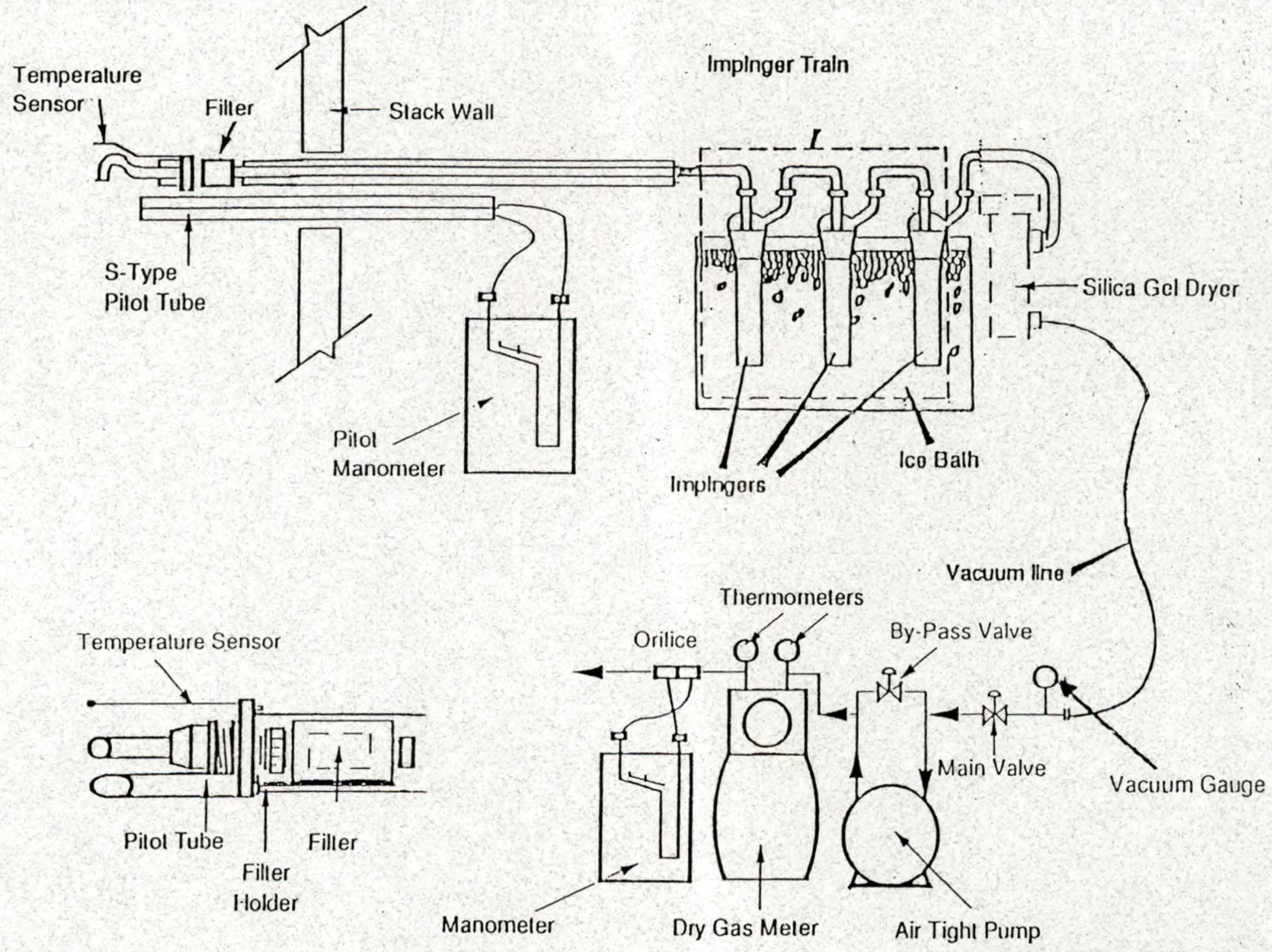

Figure 3

HCl & HF Sampling Train