SOURCE TEST REPORT
2021 COMPLIANCE TEST
MUELLER BRASS
CHIP DRYER
PORT HURON, MICHIGAN

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TO ASTM D7036 ONLY
CERT #3926.01

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REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature: _____ Date: 01 / 23 / 2022

Name: Brian Romani, QSTI Title: Field Project Manager

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: Henry M. Taylor Date: 01 / 20 / 2022

Name: Henry M. Taylor, QSTO Title: Senior Reporting Specialist

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TABLE 1-2
SUMMARY OF AVERAGE COMPLIANCE RESULTS -
CHIP DRYER
DECEMBER 16 AND 17, 2021

Parameter/Units	Average Results	Emission Limits
Total Particulate Matter (TPM) as $PM_{2.5}/PM_{10}$		
lb/hr	0.143	2.4
Total Hydrocarbons, as Propane (THC)		
lb/hr	0.028	4.0
Hydrogen Chloride (HCl)		
lb/hr	< 0.0025	1.1
Lead (Pb)		
lb/hr	2.51E-05	0.2

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

The chip dryer is a natural gas-fired chip dryer with a nominal capacity of 8,000 lb/hr of metal chips using indirect natural gas heaters rated at 4 MMBtu/hr. Pollution from the chip dryer is controlled by a cyclone heater, thermal oxidizer, dry lime injection, and a baghouse.

2.2 FLUE GAS SAMPLING LOCATION

Information regarding the sampling location is presented in Table 2-1.

TABLE 2-1
SAMPLING LOCATION

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
Chip Dryer	41.5	190 / 4.58	420 / 10.12	Isokinetic: 24 (12/port)

The sample location was verified in the field to conform to EPA Method 1. Absence of cyclonic flow conditions was confirmed following EPA Method 1, Section 11.4. See Appendix A.1 for more information.

2.3 OPERATING CONDITIONS AND PROCESS DATA

The emission tests were performed while the source and air pollution control devices were operating at the conditions required by the permit.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B.

3.1.3 EPA Method 3, Gas Analysis for the Determination of Dry Molecular Weight

EPA Method 3 is used to measure the percent O_2 and CO_2 in the gas stream. A gas sample is extracted from a stack by one of the following methods: (1) single-point, grab sampling; (2) single-point, integrated sampling; or (3) multi-point, integrated sampling. The gas sample is analyzed for percent CO_2 and percent O_2 using either an Orsat or a Fyrite analyzer.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - An Orsat analyzer was used to measure the analyte concentrations
- Method Exceptions:
  - The sample was collected into a Tedlar bag from the back of the sample train for the duration of the test run
- Target and/or Minimum Required Sample Duration: 60 minutes

3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - The reference method is used to measure moisture
  - Moisture sampling is performed as part of the pollutant sample trains
  - Since it is theoretically impossible for measured moisture to be higher than psychrometric moisture, the psychrometric moisture is also calculated, and the lower moisture value is used in the calculations
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-1.

3.1.5 EPA Methods 5 and 202, Determination of Particulate Matter Emissions from Stationary Sources and Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources

EPA Methods 5 and 202 are manual, isokinetic methods used to measure FPM and CPM emissions. The methods are performed in conjunction with EPA Methods 1 through 4. The stack gas is sampled through a nozzle, probe, heated filter, unheated CPM filter, condenser, and impinger train. FPM is collected from the probe and heater filter. CPM is collected from the unheated CPM filter and the impinger train. The samples are analyzed gravimetrically. The sum

3.1.6 EPA Method 12, Determination of Inorganic Leak Emissions from Stationary

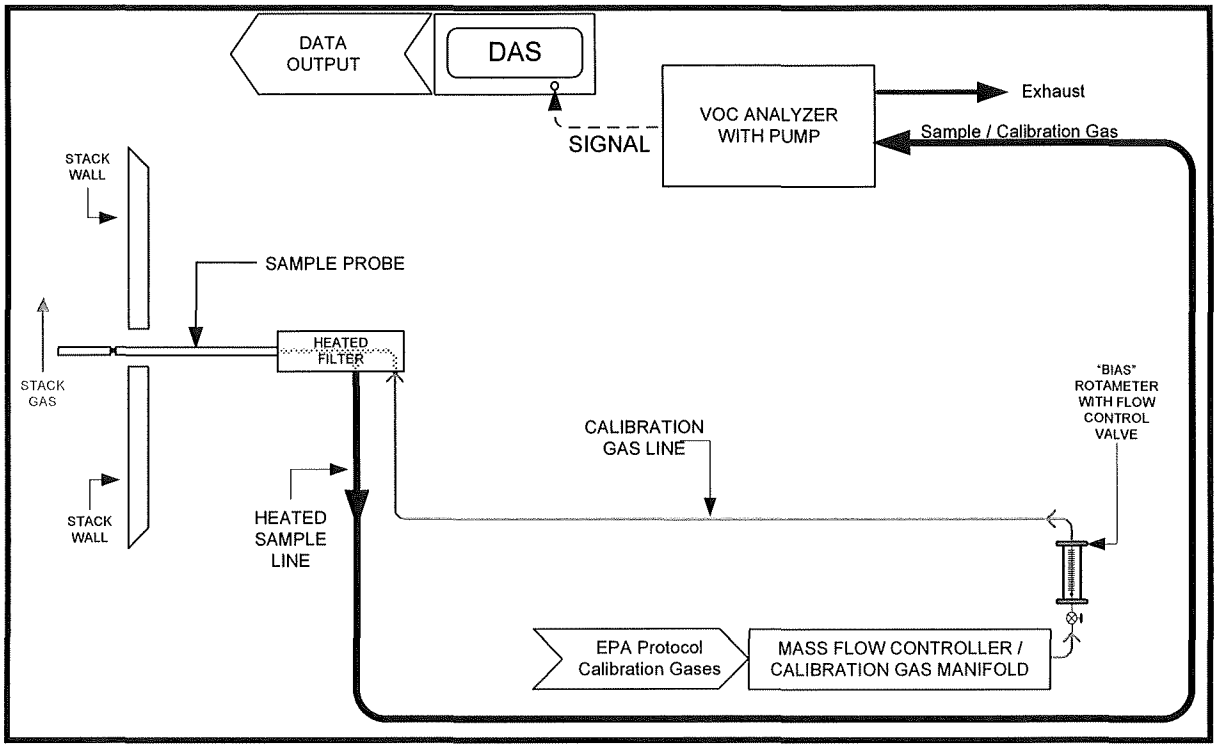
EPA Method 12 is a manual, isokinetic test method used to measure emissions of Pb. Particulate and gaseous Pb emissions are withdrawn isokinetically from the source and are collected on a filter and in dilute nitric acid. The collected samples are digested in acid solution and are analyzed by atomic absorption spectrophotometry using an air/acetylene flame.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - None
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes
- Analytical Laboratory: Element One Inc., Wilmington, North Carolina

The typical sampling system is detailed in Figure 3-2.

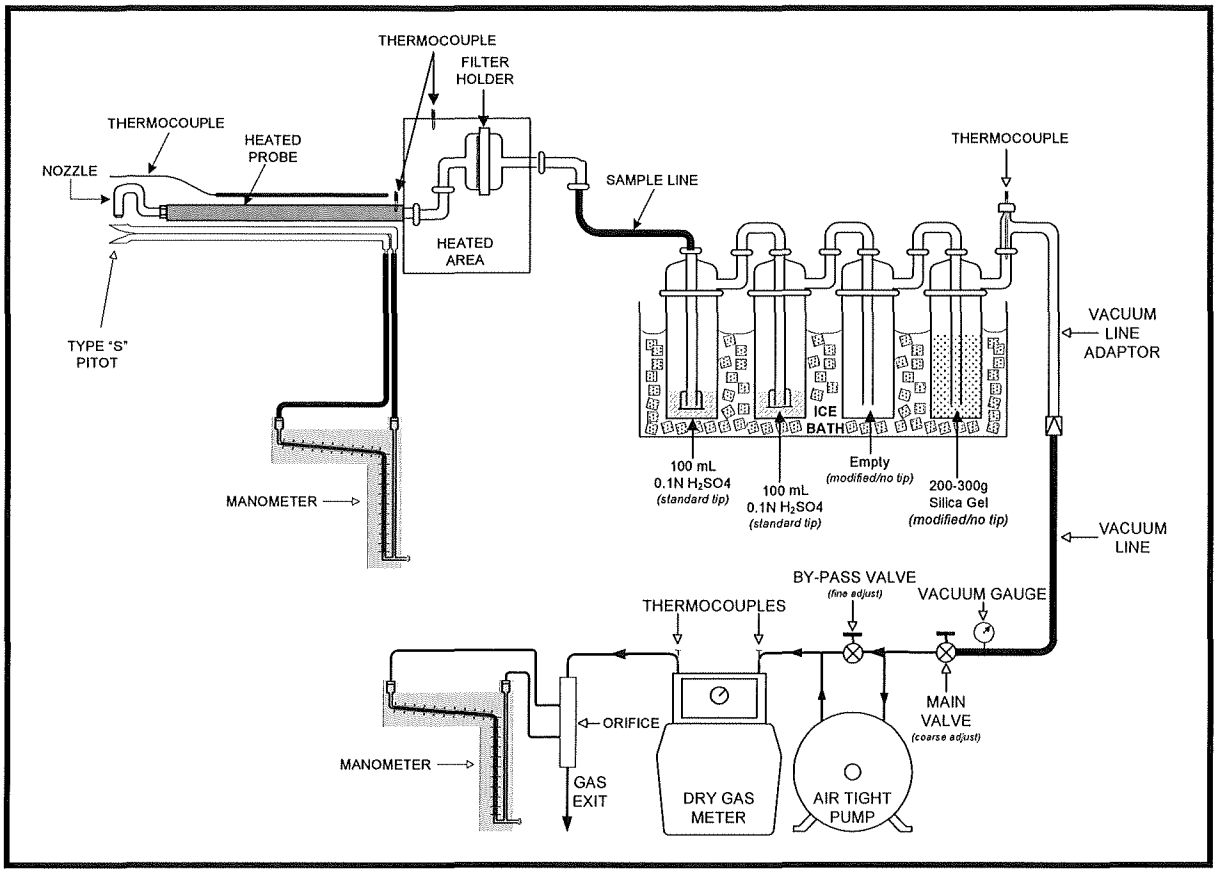
FIGURE 3-3
EPA METHOD 25A SAMPLING TRAIN



3.1.8 EPA Method 26A, Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method

EPA Method 26A is a manual, isokinetic method used to measure hydrogen chloride emissions from stationary sources. Gaseous and particulate pollutants are withdrawn isokinetically from the source and collected in an optional cyclone, on a filter, and in absorbing solutions. The cyclone collects any liquid droplets and is not necessary if the source emissions do not contain them; however, it is preferable to include the cyclone in the sampling train to protect the filter from any liquid present. The filter collects particulate matter including halide salts but is not routinely recovered or analyzed. Acidic and alkaline absorbing solutions collect the gaseous hydrogen halides and halogens, respectively. Following sampling of emissions containing liquid droplets, any halides/halogens dissolved in the liquid in the cyclone and on the filter are vaporized to gas and collected in the impingers by pulling conditioned ambient air through the sampling train. The hydrogen halides are solubilized in the acidic solution and form chloride (Cl^-), bromide (Br^-), and fluoride (F^-) ions. The halogens have a very low solubility in the acidic solution and pass through to the alkaline solution where they are hydrolyzed to form a proton (H^+), the halide ion, and the hypohalous acid (HClO or HBrO). Sodium thiosulfate is added to the alkaline solution to assure reaction with the hypohalous acid to form a second halide ion such that two halide ions are formed for each molecule of halogen gas. The halide ions in the separate solutions are measured by ion chromatography (IC). If desired, the particulate matter recovered from the filter and the probe is analyzed following the procedures in Method 5.

FIGURE 3-4
EPA METHOD 26A (HALIDES) DETACHED SAMPLING TRAIN



3.2 PROCESS TEST METHODS

The test plan did not require that process samples be collected during this test program; therefore, no process sample data are presented in this test report.

TABLE 4-1
FPM, CPM, TPM, AND THC EMISSIONS RESULTS -
CHIP DRYER

Run Number	1	2	3	Average
Date	12/16/2021	12/16/2021	12/16/2021	--
Time	07:50-08:55	09:55-11:01	11:47-12:53	--
Flue Gas Parameters				
flue gas temperature, °F	152	158	165	158
volumetric flow rate, acfm	11,673	12,041	12,055	11,920
volumetric flow rate, scfm	9,763	9,977	9,885	9,873
volumetric flow rate, dscfm	9,259	9,652	9,512	9,484
CO_2, % volume dry	1.0	0.5	0.5	0.7
O_2, % volume dry	20.0	19.8	19.8	19.9
moisture content, % volume	5.20	3.30	3.81	3.98
Sample Parameters				
duration, minutes	60	60	60	--
FPM collected, g	0.0009	0.0007	0.0016	0.0011
CPM collected, g	0.0027	0.0034	0.0041	0.0034
volume, dscf	39.10	39.84	39.15	--
isokinetic ratio, %	99.0	96.8	96.2	97.3
Filterable Particulate Matter (FPM) as $PM_{2.5}/PM_{10}$				
gr/dscf	0.00037	0.00026	0.00064	0.00042
lb/hr	0.029	0.021	0.052	0.034
Condensable Particulate Matter (CPM)				
gr/dscf	0.0011	0.0013	0.0016	0.0013
lb/hr	0.085	0.109	0.132	0.109
Total Particulate Matter (TPM) as $PM_{2.5}/PM_{10}$				
gr/dscf	0.0014	0.0016	0.0023	0.0018
lb/hr	0.114	0.130	0.184	0.143
Total Hydrocarbons (THC), as Propane				
ppmvw	0.36	0.42	0.45	0.41
lb/hr	0.024	0.029	0.031	0.028

TABLE 4-3
LEAD EMISSIONS RESULTS -
CHIP DRYER

Run Number	1	2	3	Average
Date	12/16/2021	12/16/2021	12/17/2021	--
Time	13:34-14:36	14:59-16:01	07:36-08:38	--
Flue Gas Parameters				
flue gas temperature, °F	171	165	171	169
volumetric flow rate, acfm	11,900	11,795	11,777	11,824
volumetric flow rate, scfm	9,666	9,662	9,725	9,684
volumetric flow rate, dscfm	9,362	9,417	9,420	9,400
CO_2, % volume dry	0.5	0.5	0.0	0.3
O_2, % volume dry	19.8	20.0	20.0	19.9
moisture content, % volume	3.2	2.6	3.2	3.0
Sample Parameters				
duration, minutes	60	60	60	--
Pb collected, µg	1.34	0.75	0.37	0.82
volume, dscf	40.64	40.65	39.95	--
isokinetic ratio, %	101.8	101.2	100.4	101.1
Lead (Pb)				
µg/dscm	1.16	0.65	0.32	0.71
lb/hr	4.08E-05	2.30E-05	1.14E-05	2.51E-05