Report of ...

Emission Testing

Performed for ...

Martin Marietta
Magnesia Specialties

Manistee, Michigan

On the

#1 Herreshoff & #3 Herreshoff Exhausts

June 18-19, 2024

Project #: 043.21

By

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performed for

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I. INTRODUCTION

Network Environmental, Inc. was retained by Martin Marietta Magnesia Specialties of Manistee, Michigan (SRN: A3900) to conduct an emission study at their facility. The purpose of the study was to meet the 2024 FGPERICLASEPLNT emission testing requirements of Renewable Operating Permit (ROP) No. MI-ROP-A3900-2021a.

The scope of this project was to determine the particulate emissions from the #1 Herreshoff exhaust (EUHERRFUR1) and the #3 Herreshoff exhaust (EUHERRFUR3 & EUSHAFTKILN3). Three (3) test runs were conducted on each exhaust. Each test run was sixty (60) minutes in duration.

The following test methods were employed to conduct the sampling:

- Particulate – U.S. EPA Reference Method 5
- Exhaust Gas Parameters – U.S. EPA Reference Methods 1 through 4

The sampling in the study was conducted by Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. over the period of June 18-19, 2024. Assisting in the study was Mr. Zac Chisholm of Martin Marietta Magnesia Specialties. Ms. Amy Beaver, Mr. Jeremy Howe, Ms Caryn Owens and Ms. Tammie Puite of the Michigan Department of Environment, Great Lakes and Energy (EGLE) - Air Quality Division were present to observe the testing and source operation on June 18, 2024.

II.1 TABLE 1
PARTICULATE EMISSION RESULTS SUMMARY
MARTIN MARIETTA MAGNESIA SPECIALTIES
MANISTEE, MICHIGAN
JUNE 18-19, 2024

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Particulate Concentration		Particulate Mass Rates Lbs/Hr (4)
					Lbs/1000 Lbs (2)	Lbs/1000 Lbs, Dry (3)	
#3 Herreshoff	1	6/18/24	09:51-10:57	27,172	0.011	0.014	1.72
	2	6/18/24	12:02-13:08	28,030	0.013	0.016	2.09
	3	6/18/24	13:56-15:02	27,172	0.013	0.016	2.03
	Average			**27,458**	**0.013**	**0.015**	**1.95**
#1 Herreshoff	1	6/19/24	09:24-10:28	15,185	0.014	0.019	1.33
	2	6/19/24	11:09-12:15	15,101	0.0075	0.011	0.74
	3	6/19/24	13:00-14:05	14,620	0.011	0.015	1.05
	Average			**14,969**	**0.011**	**0.015**	**1.04**

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On a Actual Basis (Stack Conditions)
(3) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On a Dry Basis
(4) Lbs/Hr = Pounds of Particulate Per Hour

III. DISCUSSION OF RESULTS

III.1 Particulate Emission Results

The total particulate emission results are summarized in Table 1 (Section II.1). A more detailed presentation of the particulate sampling can be found in Appendix A. Table 1 consists of the following information:

- Source
- Sample
- Date
- Time
- Air Flow Rates in terms of Dry Standard Cubic Feet Per Minute (DSCFM) (where standard temperature and pressure = 68 °F & 29.92 in. Hg)
- Particulate Concentrations in terms of Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Actual Basis (Lbs/1000 Lbs)
- Particulate Concentrations in terms of Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis (Lbs/1000 Lbs, Dry)
- Particulate Mass Emission Rates in terms of Pounds of Particulate Per Hour (Lbs/Hr)

III.2 Emission Limit

MI-ROP-MI-ROP-A3900-2021a has established the following particulate emission limits for these sources:

- #1 Herreshoff (EUHERRFUR1) – Particulate: 0.20 Lbs/1000 Lbs of exhaust gases
- #3 Herreshoff (EUHERRFUR3 & EUSHAFTKILN3) – Particulate: 0.055 Lbs/1000 Lbs of exhaust gases

IV. SOURCE DESCRIPTION

#1 Herreshoff: Exhaust air from the herreshoff (EUHERRFUR1) is first passed through an electrostatic precipitator (ESP) before being emitted to the atmosphere through the 53 inch I.D. exhaust stack.

#3 Herreshoff: Exhaust air from the herreshoff (EUHERRFUR3) is first passed through an electrostatic precipitator (ESP) before being emitted to the atmosphere through the 77 inch I.D. exhaust stack. Also passing through the ESP and the exhaust stack is the exhaust from the #3 Shaft Kiln (EUSHAFTKILN3).

The source operating parameters were monitored by Martin Marietta Magnesia Specialties staff and can be found in Appendix B.

V. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location for the #1 Herreshoff was on the 53 inch I.D. exhaust stack at a location approximately ten (10) duct diameters downstream and seven (7) duct diameters upstream from the nearest disturbances. Twelve (12) sampling points (six per port) were used for the particulate and air flow determinations. A diagram of the sampling location can be found in Appendix F.

Prior to the sampling, a preliminary velocity traverse, cyclonic/turbulent flow check and moisture train were conducted. The measurement location and air flows met the criteria established in U.S. EPA Reference Method 1.

The sampling/traverse points were as follows:

Sample Point	Dimension (Inches)
1	2.31
2	7.75
3	15.69
4	37.31
5	45.25
6	50.69

The sampling location for the #3 Herreshoff was on the 77 inch I.D. exhaust stack at a location approximately eight (8) duct diameters downstream and five (5) duct diameters upstream from the nearest disturbances. Twelve (12) sampling points were used for the particulate and air flow determinations. A diagram of the sampling location can be found in Appendix F.

Prior to the sampling, a preliminary velocity traverse, cyclonic/turbulent flow check and moisture train were conducted. The measurement location and air flows met the criteria established in U.S. EPA Reference Method 1.

The sampling/traverse points were as follows:

Sample Point	Dimension (Inches)
1	3.38
2	11.24
3	22.79
4	54.20
5	65.75
6	73.61

V.1 Particulate - The total particulate emission sampling was conducted in accordance with U.S. EPA Reference Method 5. Method 5 is an out of stack filtration method. Three (3) samples were collected from each of the sources. 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 from the exhausts through a heated probe and collected on a heated filter (maintained at 248 °F plus or minus 25 °F). The filters and probe/nozzle rinses were analyzed for total 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 sampling train is shown in Figure 1.

V.2 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 Method 5 sampling train.

Integrated bag samples were collected off of the Method 5 sampling train and analyzed by Orsat analysis in order to determine the oxygen (O_2) and carbon dioxide (CO_2) content of the exhaust gases. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:

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This report was reviewed by:

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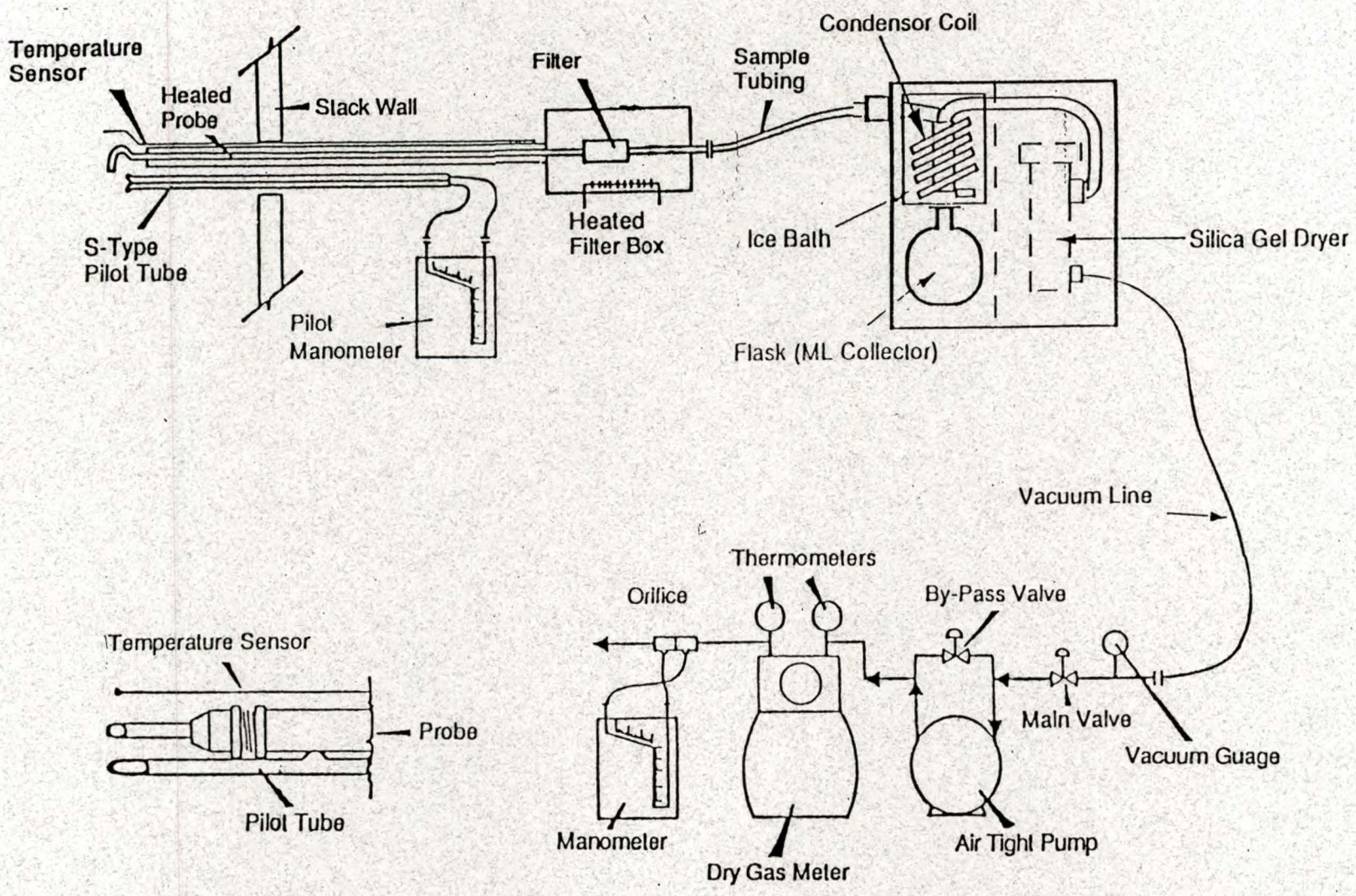

Figure 1

Particulate Sampling Train