MORTON SALT, INC.

A K+S Group Company

Certified w/RR 7012 1010 0002 9735 8424

August 30, 2013

Ms. Caryn Owens
MDEQ
Air Quality Division
120 W. Chapin Street
Cadillac, MI 49601-2158

RE: MORTON SALT COMPLIANCE EMISSION SAMPLING

Dear Ms. Owens:

Enclosed please find your copy of the Compliance Emission Sampling for various sources that was performed at Morton Salt Company on August 6-7, 2013 by Network Environmental, Inc. of Grand Rapids.

If you have any questions concerning this report, please do not hesitate to contact me at 231-723-2561 ext. 4289.

Sincerely,

Donald E. Kuk (jw)

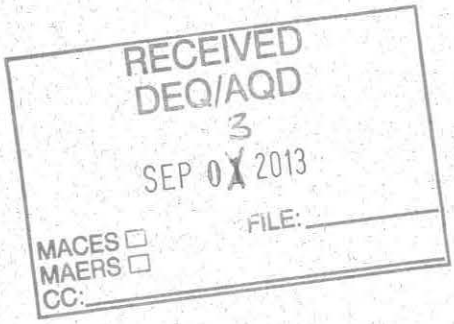
Donald E. Kuk
EHS & Security Manager

Environmental\Compliance Emission Sampling Letter.docx (jwr)

Report of...

Compliance Emission Sampling

performed for...



Morton Salt

Manistee, Michigan

on

Various Sources

August 6-7, 2013

203.06

by

Network Environmental, Inc.
Grand Rapids, MI

performed for

Morton Salt
180 Sixth Street
Manistee, MI 49660
Contact: Donald E. Kuk
Telephone: (231) 723-2561 Ext: 4289
Fax: (231) 723-7301
e-mail: dkuk@mortonsalt.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 Morton Salt of Manistee, Michigan, to conduct an emission study at their facility. The purpose of the study was to meet the emission testing requirements of Renewable Operating Permit (ROP) No. B1824-2008b. The following is a list of the sources sampled:

Source	Compounds Sampled
#6 Boiler	Particulate & Sulfur Dioxide (SO_2)
Pellet Production Baghouse	Particulate
Pellet Cooling Scrubber	Particulate

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

- Particulate – U.S. EPA Method 17
- Sulfur Dioxide (SO_2) – U.S. EPA Method 6C
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Reference Methods 1 through 4.

The sampling was performed over the period of August 6-7 by Stephan K. Byrd, Richard D. Eerdmans, and David D. Engelhardt of Network Environmental, Inc.. Assisting with the sampling was Mr. Donald E. Kuk of Morton Salt. Mr. Kurt Childs, Mr. Jeremy Howe and Ms. Caryn Owens of the Michigan Department of Environmental Quality (MDEQ) – Air Quality Division were present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
PARTICULATE EMISSION RESULTS SUMMARY
#6 BOILER EXHAUST
MORTON SALT
MANISTEE, MICHIGAN
AUGUST 7, 2013

Source	Sample	Time	Air Flow Rate DSCFM(1)	Concentration Lbs/1000 Lbs @50%EA(2)	Mass Emission Rate	
					Lbs/Hr (3)	Lbs/MMBTU (4)
#6 Boiler Exhaust	1	09:39-10:43	52,432	0.027	5.84	0.033
	2	11:01-12:04	53,967	0.024	5.26	0.030
	3	12:27-13:31	52,984	0.022	4.62	0.027
	Average		**53,128**	**0.024**	**5.24**	**0.030**

(1) DSCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) Lbs/1000 Lbs @50% EA = Pounds of Particulate Per Thousand Pounds of Exhaust Gas Corrected to 50% Excess Air
(3) Lbs/Hr = Pounds of Particulate Per Hour
(4) Lbs/MMBTU = Pounds Per Million BTU of Heat Input (Calculated Using U.S. EPA Method 19 With An F-Factor of 9,780 DSCF/MMBTU)

II.2 TABLE 2
SULFUR DIOXIDE (SO_2) EMISSION RESULTS SUMMARY
#6 BOILER EXHAUST
MORTON SALT
MANISTEE, MICHIGAN
AUGUST 7, 2013

Source	Sample	Time	Air Flow Rate DSCFM (1)	Concentration PPM (2)	Mass Emission Rate	
					Lbs/Hr (3)	Lbs/MMBTU (4)
#6 Boiler Exhaust	1	09:01-10:01	52,432	409.5	212.60	1.20
	2	10:18-11:18	53,967	516.9	276.21	1.58
	3	11:29-12:29	52,984	433.5	227.43	1.35
	Average		**53,128**	**453.3**	**238.75**	**1.38**

(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 SO_2 Per Hour
(4) Lbs/MMBTU = Pounds Per Million BTU of Heat Input (Calculated Using U.S. EPA Method 19 With An F-Factor of 9,780 DSCF/MMBTU)

II.3 TABLE 3
PARTICULATE EMISSION RESULTS SUMMARY
VARIOUS SOURCES
MORTON SALT
MANISTEE, MICHIGAN

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration Lbs/1000 Lbs, Dry (2)	Emission Rate Lbs/Hr (3)
Pellet Production Baghouse	1	8/6/13	13:56-14:59	28,779	0.0107	1.38
	2	8/6/13	15:17-16:19	28,524	0.0073	0.94
	3	8/6/13	16:30-17:33	28,182	0.0098	1.23
	Average			**28,495**	**0.0093**	**1.18**

Source	Sample	Date	Time	Air Flow Rate DSCFM (1)	Concentration Lbs/1000 Lbs (4)	Emission Rate Lbs/Hr (3)
Pellet Cooling Scrubber	1	8/6/13	08:20-09:23	7,714	0.0052	0.18
	2	8/6/13	09:32-10:34	7,940	0.0030	0.11
	3	8/6/13	10:48-11:51	7,787	0.0039	0.14
	Average			**7,813**	**0.0041**	**0.14**

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

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Tables 1 through 3 (Sections II.1 through II.3). The results are presented as follows:

III.1 #6 Boiler Particulate Emission Results (Table 1)

Table 1 summarizes the particulate emission results for the #6 Boiler as follows:

- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Lbs/1000 Lbs @ 50% EA) – Pounds of Particulate per Thousand Pounds of Exhaust Gas Corrected to Fifty Percent Excess Air
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour
- Particulate Mass Emission Rate (Lbs/MMBTU) – Pounds of Particulate Per Million BTU Of Heat Input (Calculated Using U.S. EPA Method 19 With An F-Factor of 9,780 DSCF/MMBTU)

A more detailed breakdown of each individual particulate sample can be found in Appendix A.

III.2 #6 Boiler Sulfur Dioxide (SO_2) Emission Results (Table 2)

Table 2 summarizes the SO_2 emission results for the #6 Boiler as follows:

- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- SO_2 Concentration (PPM) – Parts Per Million (v/v) On A Dry Basis
- SO_2 Mass Emission Rate (Lbs/Hr) – Pounds of SO_2 Per Hour
- SO_2 Mass Emission Rate (Lbs/MMBTU) – Pounds of SO_2 Per Million BTU Of Heat Input (Calculated Using U.S. EPA Method 19 With An F-Factor of 9,780 DSCF/MMBTU)

III.3 Pellet Production Baghouse Particulate Emissions (Table 3)

Table 3 summarizes the particulate emission results for the Pellet Production Baghouse as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)

- Particulate Concentration (Lbs/1000 Lbs, Dry) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

III.4 Pellet Cooling Scrubber Particulate Emissions (Table 3)

Table 3 summarizes the particulate emission results for the Pellet Cooling Scrubber as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration (Lbs/1000 Lbs) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas On An Actual Basis
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

III.5 Emission Limits

Source	ROP No. B1824-2008b Emission Limit(s)
#6 Boiler	Particulate: 0.30 Lbs/1000 Lbs @50% EA SO_2: 2.5 Lbs/MMBTU
Pellet Production Baghouse	Particulate: 0.03 Lbs/1000 Lbs, Dry
Pellet Cooling Scrubber	Particulate: 0.032 Lbs/1000 Lbs

IV. SOURCE DESCRIPTION

IV.1 #6 Boiler – The #6 Boiler is a Wickes spreader stoker coal and natural gas co-fired boiler. It's maximum rating is 180,000 pounds of steam per hour. The particulate matter is controlled by a baghouse. This boiler is used for generating process steam and electricity. Source operating data during the sampling can be found in Appendix B.

IV.2 Pellet Production – The pellet production area produces water softener pellets. The sources included in this process are; pellet briquetting machines, a vibratory screen, belt conveyors and bucket elevators. The particulate matter from this area is controlled by a baghouse. All the sampling was conducted during normal operation of this process.

IV.3 Pellet Cooling – The pellet cooling is a cooling system used in the production of water softener pellets. The particulate matter is controlled by a venturi scrubber. All the sampling was conducted during normal operation of this process.

V. SAMPLING AND ANALYTICAL PROTOCOL

Schematic diagrams of the sampling locations can be found in Appendix G. The sampling locations were as follows:

- #6 Boiler – On the 78 inch I.D. stack with 2 sample ports in a location that exceeded the 8 duct diameters downstream and 2 duct diameters upstream from the nearest disturbances requirement. Twelve (12) sampling points were used for this source.

- Pellet Production Baghouse – On the 36 inch I.D. exhaust stack with 2 sample ports in a location approximately 2 duct diameters downstream and 6 duct diameters upstream from the nearest disturbances. Twenty-four (24) sampling points were used for this source.

- Pellet Cooling Scrubber – On the 17 inch I.D. exhaust stack with 2 sample ports in a location approximately 8 duct diameters downstream and 6 duct diameters upstream from the nearest disturbances. Twelve (12) sampling points were used for this source.

V.1 Particulate – The particulate emission sampling was conducted in accordance with U.S. EPA Reference Method 17. Method 17 is an in-stack filtration method. Three (3) samples were collected from each of the sources sampled. Each sample was a minimum of sixty (60) minutes in duration, and had a minimum sample volume of thirty (30) dry standard cubic feet. The samples were collected isokinetically and 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 Sulfur Dioxide – The SO_2 sampling was conducted in accordance with U.S. EPA Reference Method 6C. A Bovar Model 721M gas analyzer was used to monitor the boiler exhaust. A heated teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the

temperature. From the gas conditioner stack gases were passed to the analyzer. The analyzer produces instantaneous readouts of the SO_2 concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 2,257 PPM was used to establish the initial instrument calibration. Calibration gases of 1,186 PPM and 848.9 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 848.9 PPM gas to determine the system bias. After each sample, a system zero and system injection of 848.9 PPM were 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 boiler. 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.

V.3 Oxygen & Carbon Dioxide (#6 Boiler Only) – The O_2 & CO_2 sampling was conducted in accordance with U.S. EPA Reference Method 3A. Servomex Model 1400M portable stack gas analyzers were used to monitor the boiler exhaust. A heated teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzers. The analyzers produce instantaneous readouts of the O_2 & CO_2 concentrations (%).

The analyzers were calibrated by direct injection prior to the testing. Span gases of 20.9% (ambient air) and 20.33% CO_2 were used to establish the initial instrument calibrations. Calibration gases of 12.11% O_2/6.019% CO_2 and 5.98% O_2/12.04% CO_2 were used to determine the calibration error of the analyzers. The sampling system (from the back of the stack probe to the analyzers) was injected using the 5.98% O_2/12.04% CO_2 gas to determine the system bias. After each sample, a system zero and system injection of 5.98% O_2/12.04% CO_2 were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzers were calibrated to the output of the data acquisition system (DAS) used to collect the data from the boiler. 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.

V.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 and moistures were determined using the Method 17 sampling train. Bag samples were collected from the Method 17 sampling trains (except for the #6 Boiler) and analyzed for oxygen and carbon dioxide by Orsat. 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:

Stephan K. Byrd
President

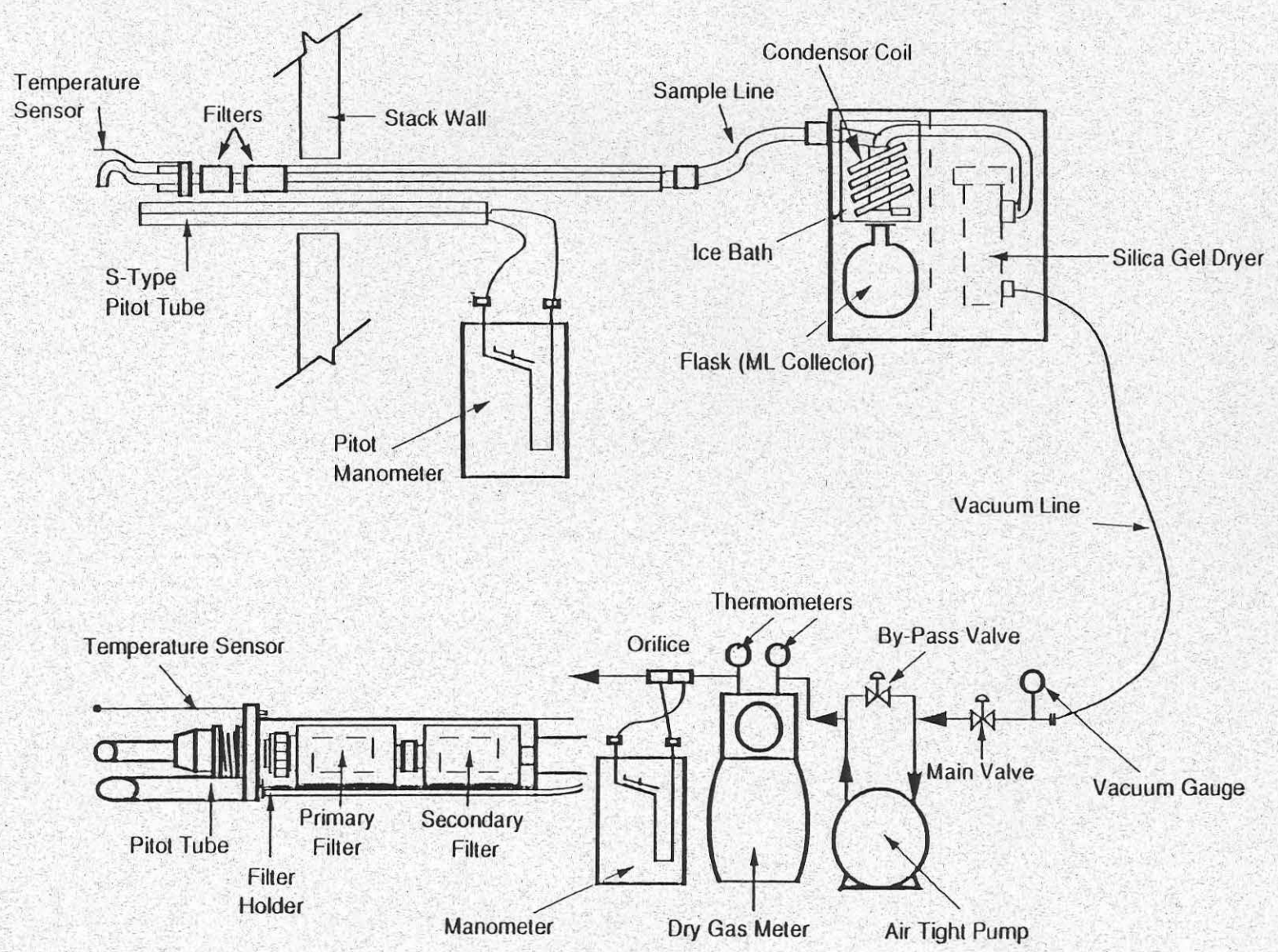


Figure 1

Particulate Sampling Train

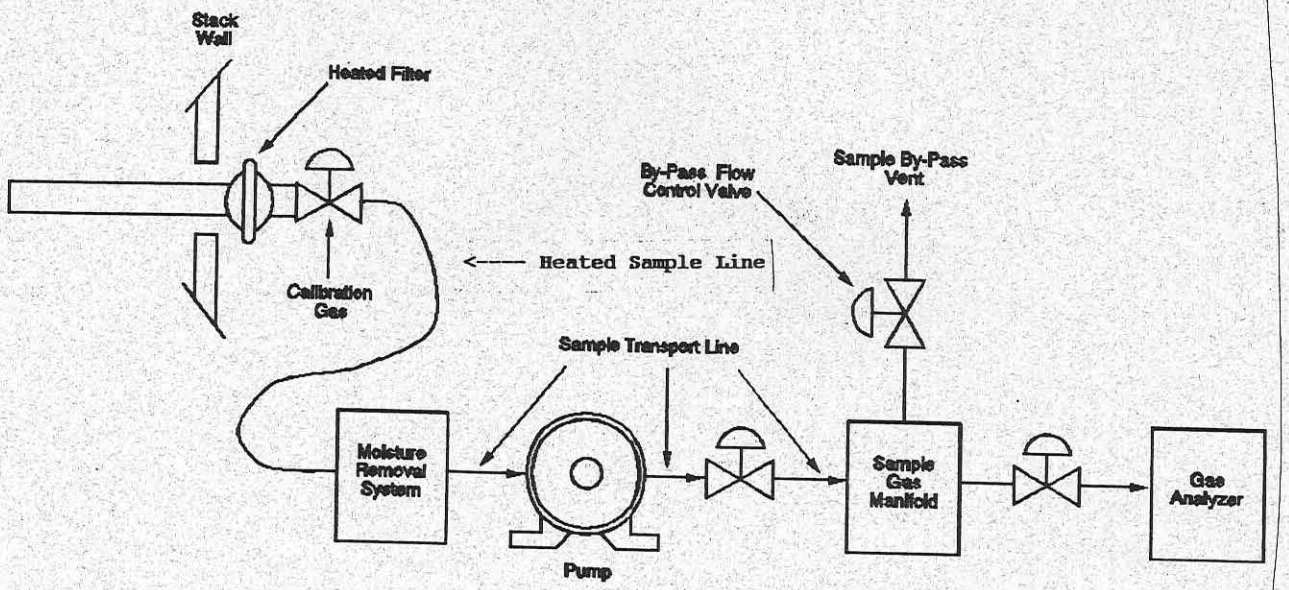


Figure 2

SO_2, O_2 & CO_2 Sampling Train (Boiler #6)