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EMISSION TEST REPORT

Report Title	TEST REPORT FOR THE VERIFICATION OF AIR POLLUTANT EMISSIONS FROM A COAL FIRED BOILER AND A MACHINE COATER
Report Date:	December 22, 2016
Test Dates	November 1-3, 2016

Facility Information	
Name Street Address City, County Phone	Neenah Paper Michigan, Inc. 501 E. Munising Avenue Munising, Alger (906) 387-7561

Facility Permit Information	
Permit To Install No.:	PTI 24-15
Operating Permit No.:	MI-ROP-B1470-2013a

Testing Contractor	
Company Mailing Address Phone Project No.	Derenzo Environmental Services 39395 Schoolcraft Road Livonia, Michigan 48150 (734) 464-3880 1604015

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AIR QUALITY DIV.

DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: Neenah Paper Michigan, Inc. County: Alger

Source Address: 501 E. Munising Avenue City: Munising

AQD Source ID (SRN): B1470 ROP No.: MI-ROP-B1470 2013a ROP Section No.: 2

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From ______ To ______

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From ______ To ______

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From ______ To ______

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Test report prepared by Derenzo Environmental Sevices, dated December 21, 2016 for the measurement of air emissions from EU05 and EUCOATER.

Test Dates: November 1-3, 2016

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Name of Responsible Official (print or type)	Title	Phone Number
David Schultz	Mill Manager	(906) 387-7561

Signature of Responsible Official: David M. Schultz

Date: 1/6/2017

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

TEST REPORT FOR THE VERIFICATION OF AIR POLLUTANT EMISSIONS FROM A COAL-FIRED BOILER AND A MACHINE COATER

NEENAH PAPER MICHIGAN, INC. MUNISING, MICHIGAN

1.0 INTRODUCTION

Neenah Paper Michigan, Inc. (Neenah Paper) has received a State of Michigan Permit to Install (PTI No. 24-15 issued April 20, 2015) and State of Michigan Renewable Operating Permit (ROP No. MI-ROP-B1470-2013a issued January 7, 2013) from the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) for the operation of its fine paper and technical product manufacturing processes located in Munising, Alger County, Michigan.

Neenah Paper recently installed a sorbent dry absorber (SDA) to reduce air pollutant emissions from its coal-fired boiler that is identified in the permit as Boiler #1 and Emission Unit EU05. This test report presents the results for sulfur dioxide (SO_2), particulate matter (PM), hydrogen chloride (HCl), and various metals (Arsenic, Barium, Chromium, Lead, Manganese, and Phosphorus) emission measurements in the Boiler #1 exhaust gas following startup of the SDA. In addition, Neenah Paper collected boiler fuel samples (coal) during the test event that were analyzed for sulfur and chloride content and gross heating value.

Neenah Paper operates a Machine Coater that is identified in the permit as Machine Coater #1 and Emission Unit EUCOATER. This test report presents the results for PM emission measurements in the Machine Coater #1 exhaust gas.

The air pollutant emission testing was performed by Derenzo Environmental Services (DES) representatives Tyler Wilson, Blake Beddow, Jason Logan, Jeff Schlaf, and Dan Wilson on November 1-3, 2016.

The exhaust gas sampling and analysis was performed in accordance with the approved Test Plan dated June 7, 2016.

Questions regarding this emission test report should be directed to:

Tyler J. Wilson
Livonia Office Supervisor
Derenzo Environmental Services
39395 Schoolcraft Road
Livonia, MI 48150
(734) 464-3880

Ms. Natalie Kentner
Environmental Engineer
Neenah Paper Michigan, Inc.
501 E. Munising Avenue
Munising, Michigan 49862
(906) 387-7561

Report Certification

This test report was prepared by Derenzo Environmental Services based on field sampling data collected by DES. Facility process data were collected and provided by Neenah Paper employees or representatives. This test report has been reviewed by Neenah Paper representatives and approved for submittal to the MDEQ-AQD.

I certify that the testing was conducted in accordance with the specified test methods and submitted test plan unless otherwise specified in this report. I believe the information provided in this report and its attachments are true, accurate, and complete.

Report Prepared By:

Tyler J. Wilson
Livonia Office Supervisor
Derenzo Environmental Services

Reviewed By:

Robert L. Harvey, P.E.
General Manager
Derenzo Environmental Services

I certify that the facility and emission units were operated at the conditions specified in this test report and as presented in the operating data provided by Neenah Paper. Based on information and belief formed after reasonable inquiry, the statements and information in this report are true, accurate and complete.

Responsible Official Certification:

1/6/17

Natalie Kentner
Environmental Engineer
Neenah Paper Michigan, Inc.

2.0 SUMMARY OF TEST RESULTS AND OPERATING CONDITIONS

2.1 Purpose and Objective of the Tests

Boiler #1 and Machine Coater #1 were tested for air pollutant emissions based on conditions of ROP No. MI-ROP-B1470-2013a and PTI No. 24-15.

2.2 Summary of Air Pollutant Sampling Results

The gases exhausted from Boiler #1 were sampled for three (3) one-hour test periods for PM, metals, and SO_2; three (3) one-hour test periods for HCl, and six (6) additional one-hour test periods for PM at alternate baghouse module conditions.

The gases exhausted from Machine Coater #1 were sampled for three (3) one-hour test periods for PM.

Table 2.1 presents a summary of air pollutant emissions and operating conditions for Boiler #1.

Table 2.2 presents a summary of air pollutant emissions and operating conditions for Machine Coater #1.

The data presented in Table 2.1 are the average of the three test periods. The average measured air pollutant emissions are less than the limits specified in ROP No. MI-ROP-B1470-2013A and PTI No. 24-15. Test results for each sampling period are presented in Tables 6.1 through 6.5.

Table 2.1 Average emissions and operating conditions during the Boiler #1 test periods

Parameter	Boiler #1	Permit Limit
Steam Generated (kpph)[1]	138	-
Coal Feed Rate (ton/hr)	6.96	-
Baghouse Pressure Drop (dP)	3.84	-
Opacity Monitor (%)	1.87	-
Spray Dry Reagent Flow Rate (gpm)	6.86	-
SO_2 Emissions (ppmvd)[2]	292	NA
SO_2 Emission Rate (lb/hr)[2]	137	NA
PM Emission Rate (lb/1,000 lb exhaust gas)[3]	0.001	0.30
PM Emission Rate (lb/1,000 lb exhaust gas)[3,4]	0.003	0.30
PM Emission Rate (lb/1,000 lb exhaust gas)[3,5]	0.001	0.30
HCl Emission Rate (lb/hr)	2.40	[Note 6]
HCl Emission Rate (lb/mmbtu)	1.29×10^{-2}	[Note 6]
Arsenic Emission Rate (lb/hr)	7.62×10^{-5}	[Note 6]
Barium Emission Rate (lb/hr)	5.35×10^{-4}	[Note 6]
Chromium Emission Rate (lb/hr)	7.11×10^{-4}	[Note 6]
Lead Emission Rate (lb/hr)	1.57×10^{-3}	[Note 6]
Manganese Emission Rate (lb/hr)	7.99×10^{-3}	[Note 6]
Phosphorus Emission Rate (lb/hr)	0.02	[Note 6]

Notes

1. Kpph = thousand pounds per hour.
2. The permit specifies a coal sulfur content limit. Exhaust gas SO_2 testing was performed to determine actual SO_2 emission rate after the SDA system.
3. Corrected to 50% excess air.
4. Four (4) baghouse modules operating. Tests were not specifically required but were performed to demonstrate compliance at alternate operation conditions.
5. Three (3) baghouse modules operating. Tests were not specifically required but were performed to demonstrate compliance at alternate operation conditions.
6. Hydrogen Chloride, Arsenic, Barium, Chromium, Lead, Manganese, and Phosphorus do not have specified emission limits except that total hazardous air pollutant (HAP) emissions must be less than 9 tons per year (TPY) per individual HAP and 22.5 TPY for all HAPs combined. PTI No. 24-15 requires that Neenah Paper test for these pollutants within 190 days of beginning SDA operation.

Table 2.2 Average emissions and operating conditions during the Machine Coater #1 test periods

Parameter	Machine Coater #1	Permit Limit
Coater Line Speed (ft/min)	802	-
Coating Use Rate (lb/hr)	2,067	-
PM Emission Rate (lb/1,000 lb exhaust gas)	0.001	0.01

3.0 SOURCE AND SAMPLING LOCATION DESCRIPTION

3.1 General Process Description

Neenah Paper operates a boiler (Boiler #1) capable of burning coal and natural gas that provides steam for electricity generation and heat to support the paper production processes. The boiler is equipped with a baghouse to control particulate emissions and SDA to control hazardous air pollutant emissions. Boiler #1 is identified as Emission Unit EU05 in PTI No. 24-15 and MI-ROP-B1470-2013a.

Latex saturation is used to increase the strength and durability of the paper and increase resistance to oils and grease. The latex coatings are applied using Machine Coater #1 and the coatings are dried in natural gas fired dryers. Machine Coater #1 is identified as Emission Unit EUCOATER in MI-ROP-B1470-2013a.

3.2 Rated Capacities and Air Emission Controls

Boiler #1 is a spreader stoker coal-fired boiler that has a rated heat input rate of 202 MMBTU/hour and an average throughput of 130 tons per day (tons/day) coal. Boiler #1 has a maximum output of 150,000 pounds steam per hour and typically operates at approximately 125,000 pounds steam per hour.

Two (2) coal scales measure and regulate coal supply to Boiler #1. The process operations are monitored and controlled by programmable controllers. The unit operates continuously and is only taken offline during periodic weekends and annual preventative maintenance. Each coal dump releases 200 lb. of fuel to the boiler.

The exhaust gas from Boiler #1 is directed to a baghouse for PM emission reduction and the SDA system for the reduction of SO_2, and HCl. The SDA exhaust gas is exhausted to atmosphere through stack SV05.

Machine Coater #1 applies latex based coatings to paper. The process typically coats approximately 13 million square yards (MMSY) of paper per month at a maximum run speed of

800 lineal feet per minute (ft/min). Paper is continuously fed through Machine Coater #1 and is only stopped to change from one paper grade to another or periodically on weekends and annual downtimes for maintenance.

The process and operations for Machine Coater #1 are monitored and controlled by programmable controllers.

The latex coatings are dried in natural gas fired dryers that are exhausted to stack SVCOATER.

3.3 Operating Conditions During the Compliance Tests

The pollutant emission tests for Boiler #1 were performed while operating conditions were near maximum capacity. During the test periods, steam production ranged from 134,700 to 146,800 pounds per hour.

The pollutant emission tests for Machine Coater #1 were performed while operating conditions were at maximum capacity. During the test periods, coater line speed ranged from 799 to 803 ft/min.

Appendix 2 provides operating records provided by Neenah Paper representatives for the test periods.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

A test protocol for the air emission testing was reviewed and approved by the MDEQ-AQD. This section provides a summary of the sampling and analytical procedures that were used during the Neenah Paper Boiler #1 and Machine Coater #1 test periods.

4.1 Summary of Sampling Methods

USEPA Method 1	Exhaust gas velocity measurement locations were determined based on the physical stack arrangement and requirements in USEPA Method 1
USEPA Method 2	Exhaust gas velocity pressure was determined using a Type-S Pitot tube connected to a red oil incline manometer; temperature was measured using a K-type thermocouple connected to the Pitot tube.
USEPA Method 3	Machine Coater #1 exhaust gas O_2 and CO_2 content was determined using a calibrated Fyrite® gas analyzer.
USEPA Method 3A	Boiler #1 exhaust gas O_2 and CO_2 content was determined using zirconia ion/paramagnetic and infrared instrumental analyzers, respectively.
USEPA Method 4	Exhaust gas moisture was determined based on the water weight gain in chilled impingers.
USEPA Method 5	Exhaust gas PM was sampled using an isokinetic sampling train and analyzed by gravimetrical analysis.
USEPA Method 6C	Boiler #1 exhaust gas SO_2 was determined using an ultraviolet (UV) fluorescence instrumental analyzer.
USEPA Method 26A	Boiler #1 exhaust gas HCl was sampled using an isokinetic sampling train and analyzed using ion chromatography analysis.
USEPA Method 29	Boiler #1 exhaust gas metals (Arsenic, Barium, Chromium, Lead, Manganese, and Phosphorus) were sampled using an isokinetic sampling train and analyzed using cold vapor atomic absorption spectroscopy and inductively coupled argon plasma emission spectroscopy analysis.

4.2 Sampling Locations (USEPA Method 1)

The SDA and baghouse exhaust gas is directed through a vertical exhaust stack (SV05) with a vertical release point to the atmosphere.

The location of the sample ports for Boiler #1 meets the USEPA Method 1 criteria for a representative sample location. The inner diameter of the duct is 84 inches. The stack is equipped with two (2) sample ports, opposed 90°, that provided a sampling location 156 inches (1.9 duct diameters) upstream and 480 inches (5.7 duct diameters) downstream from any flow disturbance.

The location of the sample ports for Machine Coater #1 meets the USEPA Method 1 criteria for a representative sample location. The inner diameter of the duct is 36 inches. The stack is equipped with two (2) sample ports, opposed 90°, that provided a sampling location 300 inches (8.3 duct diameters) upstream and 72 inches (2.0 duct diameters) downstream from any flow disturbance.

Individual traverse points were determined in accordance with USEPA Method 1.

Appendix 1 provides diagrams of the emission test sampling locations.

Appendix 3 presents Method 1 field measurement sheets.

4.3 Exhaust Gas Velocity Determination (USEPA Method 2)

The Boiler #1 and Machine Coater #1 exhaust stack gas velocity and volumetric flow rates were determined using USEPA Method 2 during each isokinetic sampling period. An S-type Pitot tube connected to a red-oil manometer was used to determine velocity pressure at each traverse point across the stack cross section. Gas temperature was measured using a K-type thermocouple mounted to the Pitot tube.

Appendix 3 provides exhaust gas flowrate calculations and field data sheets.

4.4 Exhaust Gas Molecular Weight Determination (USEPA Methods 3 & 3A)

The exhaust gas from Machine Coater #1 is primarily building air exhausted by the process ventilation system. CO_2 and O_2 content in the Machine Coater #1 exhaust gas stream was measured once at the beginning of each test period using a calibrated Fyrite analyzer.

CO_2 and O_2 content in the Boiler #1 exhaust gas stream was measured continuously throughout each test period in accordance with USEPA Method 3A. The CO_2 content of the exhaust was monitored using a Servomex 1440D single beam single wavelength (SBSW) infrared gas analyzer.

The O_2 content of the exhaust was monitored using a Servomex 1440D gas analyzer that uses a paramagnetic sensor.

During each Boiler #1 sampling period, a continuous sample of the boiler exhaust gas stream was extracted from the stack using a stainless steel probe connected to a Teflon® heated sample line. The sampled gas was conditioned by removing moisture prior to being introduced to the analyzers; therefore, measurement of O_2 and CO_2 concentrations correspond to standard dry gas conditions. Instrument response data were recorded using an ESC Model 8816 data acquisition system that monitored the analog output of the instrumental analyzers continuously and logged data as one-minute averages.

Prior to, and at the conclusion of each Boiler #1 test, the instruments were calibrated using upscale calibration and zero gas to determine analyzer calibration error and system bias (described in Section 5.0 of this document). Sampling times were recorded on field data sheets.

Appendix 4 provides O_2 and CO_2 calculation sheets. Raw instrument response data are provided in Appendix 5.

4.5 Exhaust Gas Moisture Content (USEPA Method 4)

Moisture content of the Boiler #1 and Machine Coater #1 exhaust gases were determined in accordance with the USEPA Method 4 chilled impinger method. The moisture content of the exhaust gases were determined during each isokinetic sampling run. The moisture sampling was conducted at the isokinetic sampling location (i.e., at the exhaust stack sampling ports). Moisture was removed from the sample stream using chilled impingers. The amount of moisture removed from the sample stream was determined gravimetrically by weighing the impinger contents before and after each test period.

4.6 Particulate Matter Emissions Measurements (USEPA Method 5)

Filterable PM in the Machine Coater #1 was determined using USEPA Method 5. Exhaust gas was withdrawn from the emission unit exhaust stack at an isokinetic sampling rate using an appropriately-sized stainless steel sample nozzle and heated probe. The collected exhaust gas was passed through a pre-tared glass fiber filter that was housed in a heated filter box. The heated filter box was connected directly to the PM impinger train. The impinger train consisted of a set of impingers, charged as follows:

1st impinger: 100 ml of DI H_2O
2nd impinger: 100 ml of DI H_2O
3rd impinger: empty (knock-out)
4th impinger: approximately 300 grams of pre-dried silica gel and glass fiber.

At the end of each test period the PM collected in the front half of the sampling train (from the sampling nozzle to the heated filter) was recovered in accordance with the triple rinse and brush procedures specified in USEPA Method 5. The impinger solutions were weighed gravimetrically for moisture content determination.

Recovered filters and acetone rinses of the nozzle, filter holder, and sample probe were sent to Bureau Veritas North America, Inc. (Novi, Michigan) for gravimetric measurements.

USEPA Method 5 was performed on Boiler #1 at three different operating parameters: normal/maximum operation utilizing five (5) baghouse modules, with four (4) baghouse modules operating, and with three (3) baghouse modules operating. Three (3) tests were performed at each operating parameter.

Appendix 4 provides PM calculation sheets. The laboratory report is provided in Appendix 8.

4.7 Particulate Matter and Metals Emissions Measurements (USEPA Method 5 / 29)

PM and metals (Arsenic, Barium, Chromium, Lead, Manganese, and Phosphorus) determinations in the Boiler #1 exhaust gas stream were made using a combined USEPA Method 5 / 29 train. Each sampling run was 90-minutes in duration.

USEPA Method 5 / 29 was only performed at the normal/maximum operating parameter.

A "goose-neck" nozzle constructed of borosilicate glass was connected via Teflon® fitting to a borosilicate glass probe liner within a heated stainless steel probe. The probe liner was attached to a heated glass filter holder containing a pre-weighed (tared) quartz filter. The back half of the filter holder was connected directly to the impinger train. The impinger train consisted of a set of impingers, charged as follows:

1st impinger: 100 ml of 5%HNO_3/10%H_2O_2
2nd impinger: 100 ml of 5%HNO_3/10%H_2O_2
3rd impinger: empty (knock-out)
4th impinger: approximately 300 grams of pre-dried silica gel and glass fiber.

At the conclusion of the sample period the sample recovery procedures in Method 29 were followed to recover the filter and impinger contents. Nonmetallic probe and nozzle brushes were used during the sample recovery. Glass sample bottles with Teflon® caps were used to recover the impinger contents. Particulate and metals analysis were performed by Element One, Inc. in Durham, NC.

Appendix 4 provides PM and metals calculation sheets. The laboratory report is provided in Appendix 8.

4.8 Sulfur Dioxide Emissions Measurements (USEPA Method 6C)

Exhaust gas SO_2 concentration measurements were performed at the Boiler #1 exhaust sampling location using a Thermo Scientific Analyzer Model 43i-HL that uses ultraviolet fluorescence technology in accordance with USEPA Method 6C for the measurement of SO_2 concentration.

Prior to, and at the conclusion of each test, the instrument was calibrated using upscale calibration and zero gas to determine analyzer calibration error and system bias (described in Section 5.0 of this document). Sampling times were recorded on field data sheets.

Appendix 4 provides SO_2 calculation sheets. Raw instrument response data are provided in Appendix 5.

4.9 Hydrogen Chloride Emissions Measurements (USEPA Method 26A)

Hydrogen chloride determinations in the Boiler #1 exhaust gas were determined using a USEPA Method 26A train. Each run was conducted isokinetically and was 60-minutes in duration.

A "goose-neck" nozzle constructed of borosilicate glass was connected via Teflon® fitting to a borosilicate glass probe liner within a heated stainless steel probe. The probe liner was attached to a heated glass filter holder containing a Teflon mat filter. The back half of the filter holder was connected to the impinger train. The impinger train consisted of a set of impingers, charged as follows:

1st impinger: 100 ml of 0.1N H_2SO_4
2nd impinger: 100 ml of 0.1N H_2SO_4
3rd impinger: empty; no chloride analysis
4th impinger: empty; no chloride analysis
5th impinger: approximately 300 grams of pre-dried silica gel and glass fiber.

At the conclusion of each sampling period, the impinger contents were weighed and transferred to a sample bottle. The filter was not included in the analysis and was discarded. The first and second impingers along with connecting glassware were rinsed with water, and the rinse was added to the sample bottle. The rinse and impinger solutions were sent to a third-party laboratory (Element One, Inc., Durham, North Carolina) for HCl analysis by ion chromatography.

Appendix 4 provides hydrogen chloride calculation sheets. The laboratory report is provided in Appendix 8.

5.0 QA/QC ACTIVITIES

5.1 Exhaust Gas Flow

Prior to arriving onsite, the instruments used during the source test to measure exhaust gas properties and velocity (barometer, pyrometer, and Pitot tube) were calibrated to specifications outlined in the sampling methods.

The Pitot tube and connective tubing were leak-checked prior to each traverse to verify the integrity of the measurement system.

The absence of significant cyclonic flow for the exhaust configurations were verified using an S-type Pitot tube and oil manometer. The Pitot tube was positioned at each velocity traverse point with the planes of the face openings of the Pitot tube perpendicular to the stack cross-sectional plane. The Pitot tube was then rotated to determine the null angle (rotational angle as measured from the perpendicular, or reference, position at which the differential pressure is equal to zero).

5.2 Gas Divider Certification (USEPA Method 205)

A STEC Model SGD-710C 10-step gas divider was used to obtain appropriate calibration span gases. The ten-step STEC gas divider was NIST certified (within the last 12 months) with a primary flow standard in accordance with Method 205. When cut with an appropriate zero gas, the ten-step STEC gas divider delivered calibration gas values ranging from 0% to 100% (in 10% step increments) of the USEPA Protocol 1 calibration gas that was introduced into the system. The field evaluation procedures presented in Section 3.2 of Method 205 were followed prior to use of gas divider. The field evaluation yielded no errors greater than 2% of the triplicate measured average and no errors greater than 2% from the expected values.

5.3 Instrumental Analyzer Interference Check

The instrumental analyzers used to measure SO_2, O_2 and CO_2 have had an interference response test preformed prior to their use in the field, pursuant to the interference response test procedures specified in USEPA Method 7E. The appropriate interference test gases (i.e., gases that would be encountered in the exhaust gas stream) were introduced into each analyzer, separately and as a mixture with the analyte that each analyzer is designed to measure. All of analyzers exhibited a composite deviation of less than 2.5% of the span for all measured interferent gases. No major analytical components of the analyzers have been replaced since performing the original interference tests.

5.4 Instrument Calibration and System Bias Checks

At the beginning of each day of the testing program, initial three-point instrument calibrations were performed for the SO_2, CO_2, and O_2 analyzers by injecting calibration gas directly into the inlet sample port for each instrument. System bias checks were performed prior to and at the conclusion of each sampling period by introducing the upscale calibration gas and zero gas into the sampling system (at the base of the stainless steel sampling probe prior to the particulate filter and Teflon® heated sample line) and determining the instrument response against the initial instrument calibration readings.

The instruments were calibrated with USEPA Protocol 1 certified concentrations of CO_2, O_2, and SO_2 in nitrogen and zeroed using hydrocarbon free nitrogen. A STEC Model SGD-710C ten-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

5.5 Determination of Exhaust Gas Stratification

A stratification test was performed for the Boiler #1 exhaust stack. The stainless steel sample probe was positioned at sample points correlating to 16.7, 50.0 (centroid) and 83.3% of the stack diameter. Pollutant concentration data were recorded at each sample point for a minimum of twice the maximum system response time.

The recorded concentration data for the Boiler #1 exhaust stack indicated that the measured O_2 and CO_2 concentrations did not vary by more than 5% of the mean across the stack diameter. Therefore, the Boiler #1 exhaust gas was considered to be unstratified and the compliance test sampling was performed at a single sampling location within the Boiler #1 exhaust stack.

5.6 Sampling System Response Time Determination

The response time of the sampling system was determined prior to the compliance test program by introducing upscale gas and zero gas, in series, into the sampling system using a tee connection at the base of the sample probe. The elapsed time for the analyzer to display a reading of 95% of the expected concentration was determined using a stopwatch.

The TEI Model 43i SO_2 analyzer exhibited the longest system response time at 110 seconds. Results of the response time determinations were recorded on field data sheets. For each test period, test data were collected once the sample probe was in position for at least twice the maximum system response time.

5.7 Isokinetic Sampling Equipment

The sampling consoles and dry gas meters used to extract a metered amounts of exhaust gas from the stacks were calibrated prior to and after the test event. The calibration procedure used the critical orifice calibration technique presented in USEPA Method 5. The digital pyrometer in the metering consoles was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

The Pitot tubes used for velocity pressure measurements were inspected for mechanical integrity and physical design prior to the field measurements. Support instrumentation (pyrometer, balance and barometer) were calibrated and certified prior to the test event. The sampling nozzles were inspected and calibrated (measured using a micrometer) prior to use. The isokinetic sampling trains were leak-checked prior to and following each test period. Reagent blanks were collected and analyzed as required by each respective test methods.

The sampling rate for all test periods was within 10% of the calculated isokinetic sampling rate.

5.8 Laboratory QA/QC Procedures

Blanks were shipped and handled in the same manner as the compliance samples.

All laboratory analysis were conducted according to the appropriate QA/QC procedures of the associated USEPA and ASTM methodologies and are included in the laboratory reports.

Audit samples for USEPA Reference Methods 26A (HCl) and 29 (arsenic, barium, chromium, lead, manganese, and phosphorus) were obtained from a USEPA-accredited third-party (Environmental Resource Associates, Inc., ERA) and submitted to the contract laboratory for analysis with the test impinger solutions in accordance with the USEPA's Stationary Source Audit Sample (SSAS) Program. The results of the audit analysis are included with the test results. All audit samples were deemed "acceptable" by ERA.

Appendix 8 provides a copy of the audit sample report.

6.0 <u>TEST RESULTS</u>

6.1 Coal Properties and Use Rate

Neenah Paper provided analytical reports for coal samples that were representative of the coal used during the test periods. The analytical results indicated that the coal had a heat content (gross calorific value, GCV) of approximately 13,492 Btu/lb.

The coal analytical results are presented in Appendix 7.

The amount of coal used during each test period was determined by the number of coal dumps for each one-hour period (each coal dumps contains 200 pounds). Boiler #1 used approximately 6.96 tons/hr coal during the test periods.

6.2 Boiler #1 Exhaust Test Results and Allowable Emission Limits

Operating data and air pollutant emission measurement results for each test period are presented in Tables 6.1 through 6.4.

For the Boiler #1 tests the steam generated ranged from 134,700 to 146,800 thousand pounds per hour (kpph) and the average fuel (coal) heat input rate was approximately 188 MMBtu/hr.

Filterable PM test results were adjusted to 50% excess air using Equation 5-9 in Part 10 of Michigan's Air Pollution Control Rules and compared to the permit limit of 0.30 pounds per 1,000 pounds of exhaust gas (lb/1,000 lbs).

Mass emission rates were calculated for all HAP analytes (HCl and metals). Continuous operation at the measured mass emission rates would result in HAP emissions that are less than 9.0 ton/year for each HAP and 22.5 tons/year for the combination of all measured HAP.

The measured PM emissions for the two alternate emission control scenarios that were evaluated (presented in Tables 6.3 and 6.4) were less than the permitted limit of 0.30 lb PM / 1,000 pounds exhaust gas corrected to 50% excess air.

The measured air pollutant emissions for Boiler #1 are less than the allowable limits specified in ROP No. MI-ROP-B1470-2013a and PTI No. 24-15.

6.3 Machine Coater #1 Exhaust Test Results and Allowable Emission Limits

Operating data and air pollutant emission measurement results for each Machine Coater #1 test period are presented in Table 6.5.

For the Machine Coater #1 tests, the average coater line speed was 802 ft/min and the average coating use rate was 2,067 lb/hr.

The measured PM emissions for Machine Coater #1 are less than the allowable limit specified in ROP No. MI-ROP-B1470-2013a.

6.4 Variations from Normal Sampling Procedures or Operating Conditions

The Boiler #1 USEPA Method 5/29 sample train failed the Test No. 1 post-test leak check. The collected samples were not analyzed and the test was discarded. DES proceeded to perform three (3) valid tests USEPA Method 5/29 test periods (Test Nos. 2-4). The SO_2, O_2, and CO_2 data collected during Test No. 1 are provided in Appendix 4 for informational purposes.

The testing for all pollutants was performed in accordance with USEPA methods and the approved test protocol dated June 7, 2016. The facility was operated normally during the test periods as described in this report.

Table 6.1 Measured exhaust gas conditions and SO_2, PM, and Metals emissions for Boiler #1 exhaust at Neenah Paper

Test No. Test Date Test Period (24-hr clock)	2 11/1/16 12:12-13:48	3 11/1/16 14:45-16:20	4 11/1/16 19:27-21:07	Three Test Average
Steam Generated (kpph)	137.7	139.1	137.3	138.0
Coal Feed Rate (ton/hr)	6.93	6.80	7.00	6.91
Heat Input Rate (MMBtu/hr)	189	184	187	187
Opacity Monitor (%)	1.92	1.94	1.94	1.93
Reagent Flow Rate (gpm)	6.69	7.38	6.65	6.90
Exhaust Gas Flowrate (dscfm)	47,680	45,615	47,268	46,854
Exhaust Gas Composition				
CO_2 content (%)	12.1	11.9	12.2	12.0
O_2 content (%)	7.39	7.61	7.37	7.46
Sulfur Dioxide Emissions				
SO_2 concentration (ppmvd)[1]	291	282	302	292
SO_2 emission rate (lb/hr)[1]	139	129	143	137
Sample Train Data				
Sample volume (dscf)	53.0	53.6	55.0	53.9
PM filter catch (mg)	<0.1	<0.1	<0.1	<0.1
PM in rinse (mg)	3.4	2.3	1.8	2.5
Total PM catch (mg)	3.5	2.4	1.9	2.6
Particulate Matter Emissions				
PM emissions (lb/1,000 lb gas)[2]	0.002	0.001	0.001	0.001
Permitted limit (lb/1,000 lb gas)	-	-	-	*0.30*
PM emissions (lb/hr)	0.42	0.27	0.22	0.30
Arsenic Emissions				
Arsenic catch front half (µg)	0.203	1.30	<0.10	0.53
Arsenic catch back half (µg)	0.10	0.245	<0.10	0.15
Arsenic catch total (µg)	0.30	1.55	0.20	0.68
Arsenic emissions (lb/hr)	3.61E-05	1.74E-04	2.27E-05	7.76E-05

Table 6.1 Measured exhaust gas conditions and SO_2, PM, and Metals emissions for Boiler #1 exhaust at Neenah Paper [Continued]

Test No. Test Date Test Period (24-hr clock)	2 11/1/16 12:12-13:48	3 11/1/16 14:45-16:20	4 11/1/16 19:27-21:07	Three Test Average
Barium Emissions				
Barium catch front half (μg)	3.43	2.56	2.30	2.76
Barium catch back half (μg)	4.62	0.607	0.572	1.93
Barium catch total (μg)	8.05	3.17	2.87	4.70
Barium emissions (lb/hr)	9.58E-04	3.57E-04	3.27E-04	5.47E-04
Chromium Emissions				
Chromium catch front half (μg)	10.9	3.23	2.44	5.52
Chromium catch back half (μg)	0.742	0.630	0.752	0.708
Chromium catch total (μg)	11.6	3.86	3.19	6.23
Chromium emissions (lb/hr)	1.39E-03	4.35E-04	3.63E-04	7.28E-04
Lead Emissions				
Lead catch front half (μg)	27.7	10.1	2.81	13.5
Lead catch back half (μg)	0.288	0.261	0.157	0.24
Lead catch total (μg)	28.0	10.4	2.97	13.8
Lead emissions (lb/hr)	3.33E-03	1.17E-03	3.37E-04	1.61E-03
Manganese Emissions				
Manganese catch front half (μg)	101	23.4	9.45	44.6
Manganese catch back half (μg)	29.7	24.2	22.3	25.4
Manganese catch total (μg)	131	47.6	31.8	70.0
Manganese emissions (lb/hr)	1.56E-02	5.36E-03	3.61E-03	8.17E-03
Phosphorus Emissions				
Phosphorus catch front half (μg)	6.11	3.87	7.78	5.92
Phosphorus catch back half (μg)	132	177	138	149
Phosphorus catch total (μg)	138	181	146	155
Phosphorus emissions (lb/hr)	0.02	0.02	0.02	0.02

Notes

1. The permit specifies a maximum allowable coal sulfur content of 1.5% by weight. Exhaust gas SO_2 testing was performed to determine the actual SO_2 emission rate after the SDA system.
2. Corrected to 50% excess air.

Table 6.2 Measured exhaust gas conditions and HCl emissions for Boiler #1 exhaust at Neenah Paper

Test No.	1	2	3	Three
Test Date	11/2/16	11/2/16	11/2/16	Test
Test Period (24-hr clock)	8:45-9:54	10:18-11:24	11:48-12:56	Average
Steam Generated (kpph)	137.8	136.9	137.9	137.6
Coal Feed Rate (ton/hr)	6.90	6.70	7.10	6.90
Opacity Monitor (%)	2.01	1.75	1.81	1.86
Reagent Flow Rate (gpm)	6.84	6.63	6.76	6.74
Exhaust Gas Flowrate (dscfm)	47,366	47,543	53,528	49,479
Exhaust Gas Composition				
CO_2 content (%)	12.1	12.1	12.0	12.1
O_2 content (%)	7.28	7.38	7.40	7.35
Sample Train Data				
Sample volume (dscf)	36.0	37.5	42.2	38.6
HCl catch (ug)	15,600	14,400	12,300	14,100
Hydrogen Chloride Emissions				
HCl concentration (ppmvd)	10.1	8.95	6.79	8.61
HCl emissions (lb/mmbtu)	1.44E-02	1.33E-02	1.09E-02	1.29E-02
HCl emissions (lb/hr)	2.71	2.42	2.07	2.40

Table 6.3 Measured exhaust gas conditions and PM emissions for Boiler #1 exhaust while operating four baghouse modules at Neenah Paper

Test No. Test Date Test Period (24-hr clock)	1 11/2/16 16:18-17:26	2 11/2/16 17:55-19:01	3 11/2/16 19:30-20:36	Three Test Average
Steam Generated (kpph)	137.5	137.5	138.4	137.8
Coal Feed Rate (ton/hr)	6.90	7.00	7.20	7.03
Opacity Monitor (%)	1.89	1.90	1.89	1.89
Reagent Flow Rate (gpm)	6.93	6.54	6.48	6.65
Exhaust Gas Flowrate (dscfm)	45,775	45,414	42,701	44,630
Exhaust Gas Composition				
CO_2 content (%)	12.1	12.2	12.2	12.2
O_2 content (%)	8.04	7.25	7.31	7.53
Sample Train Data				
Sample volume (dscf)	35.8	36.2	33.5	35.2
PM filter catch (mg)	<0.5	<0.5	<0.5	<0.5
PM in rinse (mg)	6.9	0.9	1.7	3.2
Total PM catch (mg)	7.4	1.4	2.2	3.7
Particulate Matter Emissions				
PM emissions (lb/1,000 lb gas[1])	0.006	0.001	0.002	0.003
Permitted limit (lb/1,000 lb gas)	-	-	-	*0.30*
PM emissions (lb/hr)	1.25	0.23	0.37	0.62

Notes
1. Corrected to 50% excess air.

Table 6.4 Measured exhaust gas conditions and PM emissions for Boiler #1 exhaust while operating three baghouse modules at Neenah Paper

Test No.	1	2	3	Three
Test Date	11/3/16	11/3/16	11/3/16	Test
Test Period (24-hr clock)	7:50-8:56	9:22-10:27	10:52-11:59	Average
Steam Generated (kpph)	139.4	138.5	137.9	138.6
Coal Feed Rate (ton/hr)	7.30	6.80	6.90	7.00
Opacity Monitor (%)	1.72	1.83	1.72	1.76
Reagent Flow Rate (gpm)	7.22	6.88	7.12	7.08
Exhaust Gas Flowrate (dscfm)	46,361	45,374	46,178	45,971
Exhaust Gas Composition				
CO_2 content (%)	12.1	12.2	12.0	12.1
O_2 content (%)	7.44	7.36	7.53	7.44
Sample Train Data				
Sample volume (dscf)	36.0	36.1	36.7	36.3
PM filter catch (mg)	<0.5	<0.5	<0.5	<0.5
PM in rinse (mg)	1.7	0.7	1.5	1.3
Total PM catch (mg)	2.2	1.2	2.0	1.8
Particulate Matter Emissions				
PM emissions (lb/1,000 lb gas[1])	0.002	0.001	0.002	0.001
Permitted limit (lb/1,000 lb gas)	-	-	-	*0.30*
PM emissions (lb/hr)	0.38	0.20	0.33	0.30

Notes

1. Corrected to 50% excess air.

Table 6.5 Measured exhaust gas conditions and air pollutant emissions for Machine Coater #1 exhaust at Neenah Paper

Test No. Test Date Test Period (24-hr clock)	1 11/3/16 14:04-15:10	2 11/3/16 15:28-16:33	3 11/3/16 17:50-18:53	Three Test Average
Coater Line Speed (ft/min)	803	803	800	802
Coating Use Rate (lbs/hr)	1,950	2,314	1,936	2,067
Exhaust Gas Flowrate (dscfm)	16,198	16,044	16,390	16,211
Exhaust Gas Composition				
CO_2 content (%)	0.00	0.00	0.00	0.00
O_2 content (%)	20.9	20.9	20.9	20.9
Sample Train Data				
Sample volume (dscf)	66.0	62.7	64.5	64.4
PM filter catch (mg)	<0.5	<0.5	0.76	0.59
PM in rinse (mg)	1.9	1.7	2.0	1.9
Total PM catch (mg)	2.4	2.2	2.8	2.5
Particulate Matter Emissions				
PM emissions (lb/1,000 lb gas)	0.001	0.001	0.001	0.001
Permitted limit (lb/1,000 lb gas)	-	-	-	*0.01*
PM emissions (lb/hr)	0.08	0.08	0.09	0.08