IMPACT
COMPLIANCE & TESTING

EMISSION TEST REPORT

Report Title	TEST REPORT FOR THE VERIFICATION OF BOILER AIR CONTAMINANT EMISSION RATES
Report Date:	November 19, 2019
Test Dates	October 1-3, 2019

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

Facility Permit Information	
Operating Permit No.:	MI-ROP-B1470-2019

Testing Contractor	
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Project No.	1900202

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TEST REPORT FOR THE VERIFICATION OF
BOILER AIR CONTAMINANT EMISSION RATES

NEENAH PAPER MICHIGAN, INC.
MUNISING, MICHIGAN

1.0 INTRODUCTION

Neenah Paper Michigan, Inc. (Neenah Paper) has received a State of Michigan Renewable Operating Permit (RO Permit No. MI-ROP-B1470-2019 issued March 12, 2019) from the Michigan Department of Environment, Great Lakes and Energy, Air Quality Division (EGLE-AQD) for the operation of its fine paper and technical product manufacturing processes located in Munising, Alger County, Michigan.

This test report presents the results for sulfur dioxide (SO_2), carbon monoxide (CO), 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, mercury and chlorine content and gross heating value.

The air pollutant emission testing was performed by Impact Compliance & Testing, Inc. (ICT) representatives Blake Beddow, Brad Thome, Clay Gaffey, and Jory VanEss on October 1-3, 2019.

The exhaust gas sampling and analysis was performed in accordance with the approved Test Plan dated August 22, 2019.

Questions regarding this emission test report should be directed to:

Blake Beddow
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Mr. Brian Ciupak
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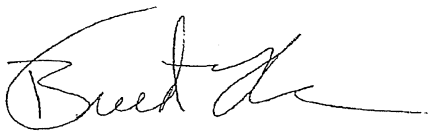
Report Certification

This test report was prepared by Impact Compliance & Testing, Inc. based on field sampling data collected by ICT. 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 EGLE-AQD.

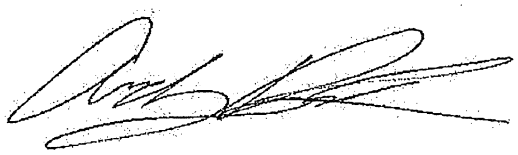
I certify that the testing was conducted in accordance with the specified test methods and submitted test plan unless otherwise specified in this report. I believe the information provided in this report and its attachments are true, accurate, and complete.

Report Prepared By:



Brad Thome
Project Manager
Impact Compliance & Testing, Inc.

Reviewed By:



Andy Rusnak
Technical Manager
Impact Compliance & Testing, Inc.

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:

Brian Ciupak
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 was tested for air pollutant emissions based on conditions of ROP No. MI-ROP-B1470-2019, and 40 CFR Part 63 Subpart JJJJJJ (Boiler GACT).

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 and Metals; and three (3) ninety-minute test periods for HCl, CO and SO_2. In addition, Neenah Paper collected boiler fuel samples (coal) during the test event that were analyzed for sulfur, mercury and chlorine content and gross heating value.

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

Table 2.2 and 2.3 presents a summary of the average operating conditions during Boiler #1 test periods

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-B1470-2019, and 40 CFR Part 63 Subpart JJJJJJ (Boiler GACT). Test results for each sampling period are presented in Tables 6.1 and 6.2.

Table 2.1 Average emission rates during the Boiler #1 test periods

Parameter	Boiler #1	Permit Limit
SO_2 Emissions (ppmvd)[1]	277	NA
SO_2 Emission Rate (lb/hr)[1]	145	NA
Fuel Sulfur Content (% by wt.)	0.75	1.5
CO Concentration (ppmvd @ 3% O_2)	4.24	420
PM Emission Rate (lb/1,000 lb exh. gas)[2]	0.001	0.30
HCl Emission Rate (lb/hr)	2.30	[Note 3]
HCl Control Efficiency (%)	88.9	[Note 3]
Mercury Emission Rate (lb/mmbtu)	2.1E-06	2.2E-05
Arsenic Emission Rate (lb/hr)	3.93×10^{-4}	[Note 3]
Barium Emission Rate (lb/hr)	7.25×10^{-4}	[Note 3]
Chromium Emission Rate (lb/hr)	3.05×10^{-4}	[Note 3]
Lead Emission Rate (lb/hr)	9.49×10^{-5}	[Note 3]
Manganese Emission Rate (lb/hr)	3.81×10^{-4}	[Note 3]
Phosphorus Emission Rate (lb/hr)	3.35×10^{-3}	[Note 3]

Notes

1. 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.
2. Corrected to 50% excess air.
3. 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 9.5 tons per year (TPY) per individual HAP and 23.5 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 operating conditions during Boiler #1 Metals test periods

Parameter	Boiler #1
Steam Generated (kpph)	135
Coal Feed Rate (ton/hr)	6.50
Baghouse Pressure Drop (dP)	1.03
Spray Dry Reagent Flow Rate (gpm)	5.79

Table 2.3 Average operating conditions during Boiler #1 HCL compliance test periods

Parameter	Boiler #1
Steam Generated (kpph)	136
Coal Feed Rate (ton/hr)	6.46
Baghouse Pressure Drop (dP)	1.03
Spray Dry Reagent Flow Rate (gpm)	5.50

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. The boiler is equipped with a baghouse to control particulate emissions and SDA to control hazardous air pollutant emissions. The boiler is identified as Emission Unit EU05 in MI-ROP-B1470-2019.

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.

A continuous load cell weighing belt is used measure and regulate coal supply to Boiler #1. The pounds of coal per hour is calculated from the total coal weight and the conveyor belt speed. This system is calibrated annually to ensure accuracy.

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, HCl, mercury and other metals. The SDA exhaust gas is exhausted to atmosphere through stack SV05.

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 metals test periods, steam production averaged 135,233 pounds per hour. During the HCL test periods, steam production averaged 135,800 pounds per hour.

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 EGLE-AQD. This section provides a summary of the sampling and analytical procedures that were used during the Neenah Paper Boiler #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 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 10	Infrared (IR) instrumental analyzer.
USEPA Method 26	Boiler #1 exhaust gas HCl was sampled using a nonisokinetic 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.

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 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)

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 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 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 Enthalpy Analytical in Durham, NC.

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

4.7 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.

4.8 Measurement of Carbon Monoxide Concentration (USEPA Method 10)

Exhaust gas CO concentration measurements were performed at the Boiler #1 exhaust sampling location using a Thermo Scientific Analyzer Model 48i-HL that uses infrared technology in accordance with USEPA Method 10 for the measurement of CO 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 CO calculation sheets. Raw instrument response data are provided in Appendix 5.

4.9 Hydrogen Chloride Emissions Measurements (USEPA Method 26)

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

A borosilicate glass probe liner within a heated stainless steel probe 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: 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 (Enthalpy Analytical, Durham, North Carolina) for HCl analysis by ion chromatography.

In addition to the three (3) HCl compliance runs, eight (8) engineering runs were tested at various Spray Dry Reagent flow rates. These tests were not a permit requirement, but were performed to provide engineering data. Appendix 9 presents these results.

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, CO, 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, 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, CO 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.

6.0 TEST RESULTS

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 13,685 Btu/lb.

The coal analytical results are presented in Appendix 7.

The amount of coal used during each test period was determined by the process information recorded from the continuous load cell weighing belt. The pounds of coal per hour is calculated from the total coal weight and the belt speed. Boiler #1 used approximately 6.50 ton/hr coal during the metals test periods and 6.46 tons/hr coal during the HCL 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 during the metals tests the steam generated averaged 135,233 pounds per hour. During the HCL test periods, steam production averaged 135,800 pounds per hour and the average fuel (coal) heat input rate was approximately 178 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). The calculated mass emission rates will be used in conjunction with operating data to determine compliance with the annual emission limits (TpY).

The measured air pollutant emissions for Boiler #1 are less than the allowable limits specified in ROP No. MI-ROP-B1470-2019.

6.3 Variations from Normal Sampling Procedures or Operating Conditions

The testing for all pollutants was performed in accordance with USEPA methods and the approved test protocol dated August 22, 2019. The facility was operated normally during the test periods as described in this report.

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

Test No.	1	2	3	Three
Test Date	10/1/19	10/1/19	10/1/19	Test
Test Period (24-hr clock)	8:48 – 10:23	11:15 – 12:49	13:35 – 15:08	Average
Steam Generated (kpph)	136	135	135	135
Coal Feed Rate (ton/hr)	6.31	6.55	6.65	6.50
Heat Input Rate (MMBtu/hr)	174	177	182	178
Coal Sulfur Content (% by wt.)	0.76	0.84	0.70	0.75
Reagent Flow Rate (gpm)	5.92	5.77	5.67	5.80
Exhaust Gas Flowrate (dscfm)	53,400	52,328	52,052	52,593
Exhaust Gas Composition				
CO_2 content (%)	12.6	12.6	12.6	12.6
O_2 content (%)	7.01	7.06	7.16	7.08
Carbon Monoxide Concentration				
CO content (ppmvd @ 3% O_2)	4.2	5.5	3.1	4.2
Permit Limit (ppmvd @ 3% O_2)	-	-	-	*420*
Sulfur Dioxide Emissions				
SO_2 concentration (ppmvd)	237	296	298	277
SO_2 emission rate (lb/hr)[1]	126	155	155	145
Sample Train Data				
Sample volume (dscf)	80.7	79.7	78.6	79.7
PM filter catch (mg)	<0.1	<0.1	<0.1	<0.1
PM in rinse (mg)	4.91	3.32	1.48	3.24
Total PM catch (mg)	4.91	3.32	1.48	3.24
Particulate Matter Emissions				
PM emissions (lb/1,000 lb gas)[1]	0.002	0.001	0.001	0.001
Permitted limit (lb/1,000 lb gas)	-	-	-	*0.30*
PM emissions (lb/hr)	0.43	0.29	0.13	0.28
Arsenic Emissions				
Arsenic catch front half (µg)	<2.5	3.4	<2.5	2.8
Arsenic catch back half (µg)	3.6	<0.50	1.0	1.7
Arsenic catch total (µg)	6.10	3.90	3.50	4.50
Arsenic emissions (lb/hr)	5.34E-04	3.39E-04	3.06E-04	3.93E-04

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

Test No.	1	2	3	Three
Test Date	10/1/19	10/1/19	10/1/19	Test
Test Period (24-hr clock)	12:12-13:48	8:48 – 10:23	11:15 – 12:49	Average
Barium Emissions				
Barium catch front half (µg)	5.4	5.4	5.6	<2.5
Barium catch back half (µg)	1.5	1.1	5.9	2.8
Barium catch total (µg)	6.90	6.50	11.50	8.30
Barium emissions (lb/hr)	6.04E-04	5.65E-04	1.01E-03	7.25E-04
Chromium Emissions				
Chromium catch front half (µg)	<2.5	<2.5	<2.5	<2.5
Chromium catch back half (µg)	1.1	0.99	0.88	0.99
Chromium catch total (µg)	3.60	3.49	3.38	3.49
Chromium emissions (lb/hr)	3.15E-04	3.03E-04	2.96E-04	3.05E-04
Lead Emissions				
Lead catch front half (µg)	<0.50	<0.50	<0.50	<0.50
Lead catch back half (µg)	0.72	0.75	0.29	0.60
Lead catch total (µg)	1.22	1.25	0.79	1.09
Lead emissions (lb/hr)	1.07E-04	1.09E-04	6.92E-05	9.49E-05
Manganese Emissions				
Manganese catch frt. half (µg)	<2.5	<2.5	<2.5	<2.5
Manganese catch bk. half (µg)	3.0	1.5	1.1	1.9
Manganese catch total (µg)	5.50	4.00	3.60	4.37
Manganese emissions (lb/hr)	4.82E-04	3.47E-04	3.15E-04	8.81E-04
Phosphorus Emissions				
Phosphorus catch frt. half (µg)	6.5	<5.0	<5.0	5.5
Phosphorus catch bk. half (µg)	34.1	32.9	31.7	32.9
Phosphorus catch total (µg)	138	181	146	155
Phosphorus emissions (lb/hr)	0.02	0.02	0.02	0.02
Mercury Emissions				
Coal Hg content (µg/g)	0.02	0.02	0.01	0.02
Calculated Hg emission rate (lb/MMBtu)	-	-	-	2.1E-06
Permitted Limit (lb/MMBtu)				*2.2E-05*

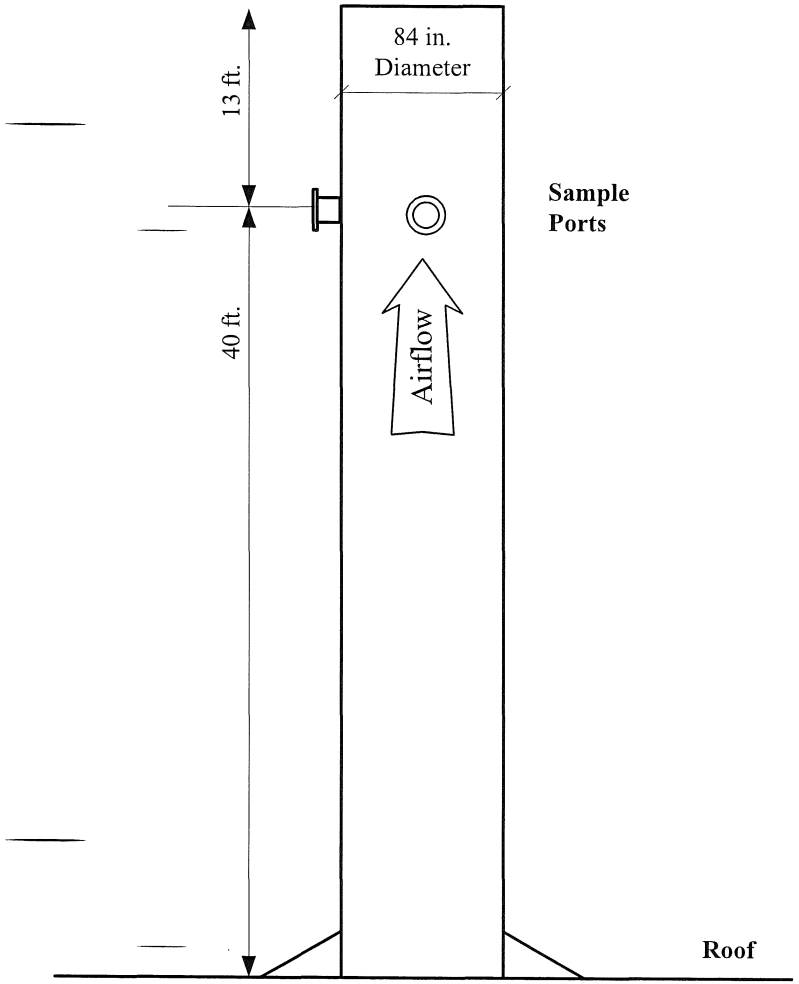
Notes
1. Corrected to 50% excess air.

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	10/2/169	10/2/19	10/2/19	Test
Test Period (24-hr clock)	7:50-10:33	11:00-12:00	12:18-13:18	Average
Steam Generated (kpph)	135.4	136.2	135.8	135.8
Coal Feed Rate (ton/hr)	6.50	6.40	6.47	6.46
Coal Chlorine Content (wt%)	0.14	0.16	0.16	0.15
Reagent Flow Rate (gpm)	5.52	5.49	5.50	5.50
Exhaust Gas Flowrate (dscfm)	52,100	47,994	51,351	50,482
Exhaust Gas Composition				
CO_2 content (%)	12.6	12.5	12.5	12.5
O_2 content (%)	7.28	7.38	7.40	7.35
Sample Train Data				
Sample volume (dscf)	45.1	44.1	44.2	44.5
HCl catch (ug)	17,091	16,155	15,253	16,166
Hydrogen Chloride Emissions and Control				
Cl inlet mass flow (lb/hr)	18.2	21.6	21.9	20.5
HCl emissions (lb/hr)	2.50	2.19	2.20	2.30
HCl control efficiency (%)	86.2	89.8	90.0	88.7

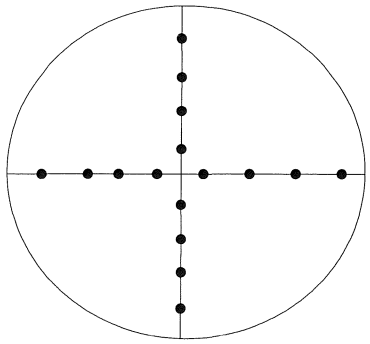
APPENDIX 1

- Sample Port Diagrams



Boiler # 1 Sampling and Measurement Locations

Stack Diameter 84 in.



Traverse Points

Sampling Point	Distance from Stack Wall (in)
1	2.7
2	8.8
3	16.3
4	27.0
5	56.9
6	67.7
7	75.2
8	81.3

8/18/16	**Neenah Paper Boiler # 1 Sampling Location Diagram**		
	Scale None	Sheet 1 of 1	Derenzo Environmental Services