Regulatory Information

Permit No. Michigan EGLE Renewable Operating Permit No. MI-ROP-N1315-2018
Permit to Install (PTI) No 24-22A

Source Information

Source Name	*Source ID*	*Target Parameters*
Press RCO	EUPRESS	PM/PM10/PM2.5
Baghouse 1	FGBH1	PM/PM10/PM2.5
Baghouse 2	FGBH2	PM/PM10/PM2.5
Baghouse 3	FGBH3	PM/PM10/PM2.5
Baghouse 4	FGBH4	PM/PM10/PM2.5
Baghouse 5	FGBH5	PM/PM10/PM2.5
Baghouse 6	FGBH6	PM/PM10/PM2.5
Baghouse 8	FGBH8	PM/PM10/PM2.5

Contact Information

Test Location
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Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Edward "EJ" Juers
Alliance Technical Group, LLC

10/13/2023
Date

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APPENDICES

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Louisiana-Pacific Corporation (LP) to conduct compliance testing at the Sagola, MI facility. The facility operates under the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit (ROP) No. MI-ROP-N1315-2018 and Permit to Install (PTI) 24-22. Testing was conducted to determine the emission rates of particulate matter (PM), particulate matter less than 10 microns (PM10), and particulate matter less than 2.5 microns (PM2.5) from the Press RCO and seven (7) baghouses.

1.1 Facility Description

The Louisiana-Pacific Corporation Sagola Plant is an orientated strand board manufacturing facility that produces siding used for various construction applications. The facility is identified by the NAICS Code 321219.

The plant purchases small diameter logs that are debarked and fed to a waferizer. The bark removed from the logs is used as fuel for the thermal oil heater. The waferizer flakes the logs into strands, which are approximately three (3) inches long by one (1) inch wide, and 0.03125 (1/32) of an inch thick. The wet flakes go through a rotary dryer, which reduces the flake moisture content from approximately 50% down to 5%. The flakes are then captured by a cyclone and the exhaust gas passes through a wet electrostatic precipitator (WESP) followed by a regenerative thermal oxidizer (RTO).

The flakes collected by the primary cyclone drop into a rotary screen, which separates usable flake and small wood pieces (fines). The material passing through the screen is used as fuel in the dryers, the usable flake is routed to the blenders. Wax, resin, and zinc borate are mixed with the flakes in the blenders. Formers then evenly distribute the resinated flakes into a continuous mat of flakes onto moving conveyor. The continuous mat is separated into press size segments by the flying cut-off-saw. After the flying cut-off saw, a paper overlay is added to the mat of flake.

The loader conveys the mats into the press; with the combination of heat (supplied by the thermal oil heater) and pressure, the mats are turned into solid boards of various predetermined thickness. The emissions from the pressing process are captured within an enclosure and routed to a Regenerative Catalytic Oxidizer (RCO). The boards are unloaded from the press and cut with saw blades to various lengths and widths of siding. The dust created by the finishing process will be reused on the forming line in the production of more mats that will be pressed.

1.2 Source and Control System Descriptions

Emissions from the board pressing process are captured within an enclosure and routed to a Regenerative Catalytic Oxidizer (RCO). The RCO includes a catalyst that enables lower temperature treatment of the pressing process gases. A preventative maintenance program is in place to ensure the RCO and catalyst operate in an efficient manner. RCO performance testing was previously conducted on August 24, 2021, as required by the Plant's ROP and 40 CFR Part 63, Subpart DDDD-NESHAP for Plywood and Composite Wood Products.

Each of these flexible groups includes a newly installed baghouse manufactured by Schenck Process LLC to control emissions from various plant sources (FGBH7 is planned for future installation). The baghouses are continuously operating self-cleaning units that use medium pressure high volume air to clean the bags. Maintenance and inspection programs have been developed to ensure these new baghouses operate at optimum efficiency.

1.3 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	Joe Bal
Regulatory Personnel	Regina Angellotti
Alliance Personnel	Ryan Lenksi Colin Kelly Corbin Godfrey Stefan Schultz Nolan Wright

1.4 Test Protocol & Notification

Testing was conducted in accordance with the test protocol submitted to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Marquette.

1.5 Test Program Notes

On run #2 on FGBH2, the production rate only shows 17.17 TFP/hr with 3.6 hours of run time due to the line going down for ½ hour during the test. When the line went down the test was suspended until the unit was running again, however, the total shown run time includes the suspended time.

2.0 Summary of Results

Alliance conducted compliance testing at the LP facility in Sagola, MI on August 29-31, 2023. Testing consisted of determining the emission rates of PM, PM10, & PM2.5 at the Press RCO and seven (7) baghouses. 100% hardwood was processed during all testing.

Table 2-1 to 2-8 provide summaries of the emission testing results with comparisons to the applicable Michigan permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1: Summary of Results – Press RCO

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/31/23**	**8/31/23**	**8/31/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	0.0014	0.0015	0.0014	0.0014
Emission Rate, lb/hr	0.98	0.98	0.95	0.97
Emission Factor, lb/ton	0.045	0.040	0.039	0.042
Condensable Particulate Matter Data				
Concentration, grain/dscf	0.0016	0.0018	0.0025	0.0020
Emission Rate, lb/hr	1.1	1.2	1.7	1.3
Emission Factor, lb/ton	0.051	0.048	0.069	0.056
Total Particulate Matter Data				
Concentration, grain/dscf	0.0031	0.0033	0.0039	0.0034
Emission Rate, lb/hr	2.1	2.2	2.6	2.3
Emission Factor, lb/ton	0.096	0.089	0.109	0.098

Table 2-2: Summary of Results – FGBH1

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/29/23**	**8/29/23**	**8/29/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	4.1E-04	3.5E-04	2.0E-04	3.2E-04
Emission Rate, lb/hr	0.124	0.111	0.064	0.100
Emission Factor, lb/ton	5.3E-03	4.8E-03	2.8E-03	4.3E-03
Condensable Particulate Matter Data				
Concentration, grain/dscf	2.4E-04	6.2E-04	3.0E-04	3.8E-04
Emission Rate, lb/hr	0.072	0.199	0.096	0.122
Emission Factor, lb/ton	3.0E-03	8.6E-03	4.2E-03	5.3E-03
Total Particulate Matter Data				
Concentration, grain/dscf	6.4E-04	9.7E-04	4.9E-04	7.0E-04
Emission Rate, lb/hr	0.20	0.31	0.16	0.22
Emission Factor, lb/ton	8.3E-03	1.3E-02	7.1E-03	9.6E-03

Table 2-3: Summary of Results – FGBH2

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/30/23**	**8/30/23**	**8/30/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	4.6E-04	3.3E-04	3.2E-04	3.7E-04
Emission Rate, lb/hr	0.129	0.095	0.094	0.106
Emission Factor, lb/ton	5.7E-03	5.5E-03	3.9E-03	5.0E-03
Condensable Particulate Matter Data				
Concentration, grain/dscf	1.7E-04	1.6E-04	1.4E-04	1.6E-04
Emission Rate, lb/hr	0.047	0.047	0.041	0.045
Emission Factor, lb/ton	2.1E-03	2.8E-03	1.7E-03	2.2E-03
Total Particulate Matter Data				
Concentration, grain/dscf	6.2E-04	4.9E-04	4.5E-04	5.2E-04
Emission Rate, lb/hr	0.18	0.14	0.14	0.15
Emission Factor, lb/ton	7.7E-03	8.3E-03	5.6E-03	7.2E-03

Table 2-4: Summary of Results – FGBH3

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/29/23**	**8/29/23**	**8/29/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	4.0E-04	2.9E-04	2.5E-04	3.1E-04
Emission Rate, lb/hr	0.082	0.062	0.052	0.065
Emission Factor, lb/ton	3.4E-03	2.7E-03	2.3E-03	2.8E-03
Condensable Particulate Matter Data				
Concentration, grain/dscf	1.6E-04	2.1E-04	1.6E-04	1.8E-04
Emission Rate, lb/hr	0.032	0.044	0.035	0.037
Emission Factor, lb/ton	1.4E-03	1.9E-03	1.6E-03	1.6E-03
Total Particulate Matter Data				
Concentration, grain/dscf	5.5E-04	5.0E-04	4.1E-04	4.9E-04
Emission Rate, lb/hr	0.115	0.106	0.086	0.102
Emission Factor, lb/ton	4.8E-03	4.6E-03	3.9E-03	4.4E-03

Table 2-5: Summary of Results – FGBH4

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/30/23**	**8/30/23**	**8/30/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	3.0E-04	2.4E-04	4.4E-04	3.3E-04
Emission Rate, lb/hr	0.104	0.080	0.153	0.112
Emission Factor, lb/ton	4.1E-03	3.6E-03	6.4E-03	4.7E-03
Condensable Particulate Matter Data				
Concentration, grain/dscf	3.9E-04	2.6E-04	2.4E-04	3.0E-04
Emission Rate, lb/hr	0.136	0.088	0.083	0.102
Emission Factor, lb/ton	5.4E-03	4.0E-03	3.4E-03	4.3E-03
Total Particulate Matter Data				
Concentration, grain/dscf	7.0E-04	4.9E-04	6.8E-04	6.2E-04
Emission Rate, lb/hr	0.24	0.17	0.24	0.21
Emission Factor, lb/ton	9.6E-03	7.6E-03	9.8E-03	9.0E-03

Table 2-6: Summary of Results – FGBH5

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/29/23**	**8/29/23**	**8/29/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	1.0E-03	5.2E-04	2.8E-04	6.1E-04
Emission Rate, lb/hr	0.41	0.21	0.12	0.25
Emission Factor, lb/ton	1.8E-02	8.6E-03	5.3E-03	1.1E-02
Condensable Particulate Matter Data				
Concentration, grain/dscf	2.5E-04	2.0E-04	2.6E-04	2.4E-04
Emission Rate, lb/hr	0.101	0.083	0.108	0.097
Emission Factor, lb/ton	4.3E-03	3.4E-03	4.9E-03	4.2E-03
Total Particulate Matter Data				
Concentration, grain/dscf	1.3E-03	7.2E-04	5.5E-04	8.5E-04
Emission Rate, lb/hr	0.52	0.29	0.23	0.35
Emission Factor, lb/ton	0.022	0.012	0.010	0.015

Table 2-7: Summary of Results – FGBH6

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/30/23**	**8/30/23**	**8/30/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscf	2.5E-04	2.8E-04	2.6E-04	2.6E-04
Emission Rate, lb/hr	0.12	0.13	0.13	0.13
Emission Factor, lb/ton	4.6E-03	6.1E-03	5.4E-03	5.3E-03
Condensable Particulate Matter Data				
Concentration, grain/dscf	3.2E-04	3.7E-04	2.4E-04	3.1E-04
Emission Rate, lb/hr	0.15	0.18	0.12	0.15
Emission Factor, lb/ton	5.8E-03	8.1E-03	4.8E-03	6.2E-03
Total Particulate Matter Data				
Concentration, grain/dscf	5.7E-04	6.4E-04	5.0E-04	5.7E-04
Emission Rate, lb/hr	0.28	0.31	0.25	0.28
Emission Factor, lb/ton	0.010	0.014	0.010	0.012

Table 2-8: Summary of Results – FGBH8

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	**8/29/23**	**8/29/23**	**8/29/23**	**--**
Filterable Particulate Matter Data				
Concentration, grain/dscfr	6.1E-04	3.8E-04	2.9E-04	4.3E-04
Emission Rate, lb/hr	0.137	0.087	0.070	0.098
Emission Factor, lb/ton	5.8E-03	3.5E-03	3.1E-03	4.1E-03
Condensable Particulate Matter Data				
Concentration, grain/dscfr	2.7E-04	2.5E-04	1.9E-04	2.4E-04
Emission Rate, lb/hr	0.062	0.059	0.044	0.055
Emission Factor, lb/ton	2.6E-03	2.4E-03	2.0E-03	2.3E-03
Total Particulate Matter Data				
Concentration, grain/dscfr	8.8E-04	6.3E-04	4.8E-04	6.6E-04
Emission Rate, lb/hr	0.20	0.15	0.11	0.15
Emission Factor, lb/ton	8.4E-03	5.8E-03	5.0E-03	6.4E-03

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5/202	Isokinetic Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and inclined manometer. The stack gas temperature was measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings were recorded during each test run. The data collected was utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

The O_2 and CO_2 concentrations were assumed to be ambient for molecular weight and volumetric flow rate calculations on each baghouse source.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing on the RCO was conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to testing, each impinger was filled with a known quantity of water or silica gel. Each impinger was analyzed gravimetrically before and after each test run on the same balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and four (4) chilled impingers. The first, and second impingers were initially empty, the third contained 100 mL of de-ionized water and the last impinger contained 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The nitrogen purge was omitted due to minimal condensate collected in the dry impingers. After the leak check the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed six (6) times with acetone to remove any adhering particulate matter and these rinses were recovered in container 2. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses were added to container CPM Cont. #1 while the solvent rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed with DIUF water and then with acetone, followed by hexane. The water rinse was added to container CPM Cont. #1 while the solvent rinses were added to container CPM Cont. #2. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data was relinquished to the report coordinator and then a final review was performed by the Project Manager.