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Source Test Report

Decorative Panels International
416 Ford Avenue
Alpena, Michigan

Source Tested: No. 1 Biofilter (Inlet/Outlet)
Test Date: October 18, 2023

Project No. AST-2023-3914

Prepared By
Alliance Technical Group, LLC
20 Parkway View Drive
Pittsburgh, PA 15205

Regulatory Information

Permit No. Michigan Department of Environment, Great Lakes, and Energy Air Quality
Division (EGLE) Operating Permit NO. MI-ROP-B1476-2015a
Regulatory Citation 40 CFR 63, Subpart DDDD

Source Information

| <i>Source Name</i> | <i>Source ID</i> | <i>Target Parameters</i> |
|--------------------|------------------|-------------------------------------|
| No. 1 Biofilter | --- | DE of THC, HCHO, CH ₃ OH |

Contact Information

Test Location
Decorative Panels International
416 Ford Ave
Alpena, MI

Facility Contact:
Timothy Rombach
Senior Environmental Engineer
timothy.rombach@decpanels.com
(989) 356-8568

Test Company
Alliance Technical Group, LLC
20 Parkway View Drive
Pittsburgh, PA 15205

Project Manager
Adam Robinson
adam.robinson@alliancetg.com
(412) 668-4040

Field Team Leader
Samuel Hines
samuel.hines@alliancetg.com
(412) 892-1342

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Hailey Adamik
hailey.adamik@alliancetg.com

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.



12/13/23

Adam Robinson
Project Manager
Alliance Technical Group, LLC

Date



12/13/23

Samuel Hines
Field Team Leader
Alliance Technical Group, LLC

Date

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Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Apex Companies, on behalf of Decorative Panels International, INC (DPI) to conduct compliance testing at the Alpena, Michigan facility. Portions of the facility are subject to provisions of the Michigan Department of Environment, Great Lakes, and Energy Air Quality Division (EGLE) Operating Permit NO. MI-ROP-B1476-2015a and National Hazardous Air Pollutants (NESHAP) 40 CFR 63, Subpart DDDD. Testing included determining the destruction efficiency of total hydrocarbons (THC), formaldehyde (HCHO), and methanol (CH₃OH) of the No. 1 Biofilter.

1.1 Facility and Control Unit Descriptions

Decorative Panels International produces a variety of hardboard products including wall paneling, pegboard, and marker board. Hardwood chips, such as aspen, ash, maple, and beech chips, are purchased and stored in an outdoor raw material storage area and reclaimed into silos. The wood chips are cooked and softened in one of four digesters using steam injection and ground into wood pulp fibers. The pulp fibers are conveyed to a forming machine, which forms a mat of un-pressed hardboard. The mats are processed through a Coe® dryer and cut using a trimmer and panel brush. The mats are conveyed to one of two hardboard lines, Line 1 or 3. Line 2 was historically operated but has since been decommissioned. On the hardboard lines, the mats enter a predryer, a press, cooler, and tempering area. The predryer ensures the mat has the desired moisture content before the mat enters presses that heat and form hardboard. The hardboard is coated with linseed or Oxi-Cure® oil in the tempering area. The oil tempers the board thereby increasing its strength and "paintability." Once the board has been tempered, it is superheated to cure the binding resins in the bake ovens (No. 3 Press line only). The hardboard is humidified to approximate atmospheric conditions to limit warping. The boards are inspected, graded, cut, and packed for shipping. The No. 1 Biofilter controls emissions from the No. 1 Press and Board Cooler.

Gaseous emissions from the No. 1 Press and Board Cooler are controlled by a DynaWave Engineering water scrubber and the No. 1 Biofilter. Emissions from the No. 1 Press and Board Cooler are captured by a permanent total enclosure that surrounds the press area. The air from the enclosure continuously exhausts through a duct that exits the roof of the building and flows towards the pollution control equipment. The captured air (flue gas) enters the top of the scrubber and flows downwards in the vessel. Inside the vessel, water (containing sodium hydroxide to maintain a neutral pH) is sprayed into the air to remove particulates and humidify the air before the air enters the biofilter. The water is sprayed onto a series of chevrons to increase the air-to-water contact surface area. As the flue gas mixes with the water, particulates and other pollutants are removed. The water drains to the bottom of the vessel and a portion is recirculated into the system with the remaining portion discharged to the on-site water treatment system. The flue gas exits the top of the scrubber and flows into the No. 1 Biofilter.

The No. 1 Biofilter, manufactured by Monsanto Enviro-Chem., consists of six compartments. The air from the scrubber can be heated by a heat exchanger before being directed into the six-biobed compartments. The compartments contain water sprayers to maintain a moist environment, and layers of Douglas-fir bark from the western United States. The Douglas-fir bark provides an environment where biologically active microbes can oxidize and remove the contaminants. After passing through the bark, the flue gas is drawn into fans that discharge the gas through stack, SVS2COOLR-STK28.

1.2 Project Team

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

Table 1-1: Project Team

| | |
|---------------------------|---|
| Facility Personnel | Timothy Rombach |
| Apex Consultant | Derek Wong |
| Alliance Personnel | Samuel Hines Calvin Enderby Jim Rullo |

1.3 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) submitted to EGLE.

1.4 Test Program Notes

From 12:35 to 13:05, booster fans were not running, resulting in aborting the run. Voided test run data is provided in Appendix F – Voided Data. In addition, permission was granted by EGLE during the test to use U.S. EPA Reference Test Method 320, rather than Method 4, for moisture.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the DPI facility located in Alpena, Michigan. Testing included determining the destruction efficiency of total hydrocarbons (THC), formaldehyde (HCHO), and methanol (CH₃OH) from the No. 1 Biofilter.

Table 2-1 provides a summary of the emission testing results with comparisons to the applicable 40 CFR 63, Subpart DDDD and EGLE permit limits. Any difference between the summary results listed in the following table and the detailed results contained in appendices is due to rounding for presentation.

As stated in the site specific test plan, the Plywood MACT provides various options for demonstrating compliance: production-based compliance, compliance options for add-on control systems and emissions averaging compliance option. DPI intended to demonstrate compliance by §63.2240 (b) – Compliance options for add-on control systems. Compliance requirements for §63.2240 (b) are summarized below:

- (1) Reduce emission of total HAPs, measured as total hydrocarbons (THC) (as carbon) by 90% (methane may be subtracted from the THC as carbon measurements);
- (2) Limit emissions of total HAP, measured as THC (as carbon) to 20 ppmvd (methane may be subtracted from the THC as carbon measurements);
- (3) Reduce methanol emissions by 90%;
- (4) Limit methanol emissions to less than or equal to one (1) ppmvd if uncontrolled methanol emissions entering the control device are greater than or equal to 10 ppmvd;
- (5) Reduce formaldehyde emissions by 90 %; or
- (6) Limit formaldehyde emission to less than or equal to one (1) ppmvd if uncontrolled emissions entering the control device are greater than or equal to 10 ppmvd.

Testing met compliance according to option (5) – reduction of formaldehyde emissions by 90%, as shown below in Table 2-1.

Table 2-1: Summary of Results – No. 1 Biofilter

| Emissions Data | | | | |
|--|----------|----------|----------|-------------|
| Run Number | Run 1 | Run 2 | Run 3 | Average |
| Date | 10/18/23 | 10/18/23 | 10/18/23 | -- |
| Formaldehyde Data | | | | |
| Inlet Emission Rate, lb/hr | 7.5 | 6.8 | 5.0 | 6.4 |
| Outlet Emission Rate, lb/hr | 0.47 | 0.48 | 0.46 | 0.47 |
| Reduction Efficiency, % | 93.7 | 93.1 | 90.8 | 92.5 |
| Reduction Efficiency Limit, % | -- | -- | -- | ≥ 90 |
| Methanol Data | | | | |
| Inlet Emission Rate, lb/hr | 9.0 | 8.6 | 7.0 | 8.2 |
| Outlet Emission Rate, lb/hr | 3.8 | 3.8 | 4.6 | 4.0 |
| Reduction Efficiency, % | 58.3 | 56.1 | 34.6 | 49.6 |
| Total Hydrocarbons Data (as carbon) | | | | |
| Inlet Emission Rate, lb/hr | 26.8 | 22.3 | 18.1 | 22.4 |
| Outlet Emission Rate, lb/hr | 5.1 | 4.7 | 5.1 | 5.0 |
| Reduction Efficiency, % | 80.9 | 78.9 | 72.0 | 77.2 |

Testing Methodology

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 C.

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 | 3A | Instrumental Analysis |
| Total Hydrocarbons | 25A | Instrumental Analysis |
| Formaldehyde, Methanol & Moisture | 320 | FTIR – Continuous 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) 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 before and after each test run. The data collected before and after each test run was averaged. The averages were utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

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

The oxygen (O₂) and carbon dioxide (CO₂) testing was conducted in accordance with U.S. EPA Reference Test Method 3A. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system was a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line was used, then a portable non-contact condenser was placed in the system directly after the probe. Otherwise, a heated Teflon sample line was used. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 25A – Total Hydrocarbons

The total hydrocarbons (THC) testing was conducted in accordance with U.S. EPA Reference Test Method 25A. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless-steel probe, heated Teflon sample line(s) and the identified gas analyzer. The quality control measures are described in Section 3.6.

3.4 U.S. EPA Reference Test Method 320 – Formaldehyde, Methanol & Moisture

The concentrations of formaldehyde, methanol, and moisture were determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream was extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured were selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio were measured and recorded to document analyzer performance. A leak check was performed on the sample cell. The instrument path length was verified using ethylene as the Calibration Transfer Standard. Dynamic spiking was performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

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

EPA Protocol 1 Calibration Gases

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.

Direct Calibration & Calibration Error Test

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.

System Bias and Response Time

High or Mid Level gas (whichever was closer to the stack gas concentration) was introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it reached a stable value, and this value was recorded. Next, Low Level gas was introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

High or Mid Level gas (whichever was closer to the stack gas concentration) was introduced at the probe. After the analyzer response was stable, the value was recorded. Next, Low Level gas was introduced at the probe, and the analyzer value recorded once it reached a stable response. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference or the data was invalidated and the Calibration Error Test and System Bias were repeated.

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Post Test Drift Checks

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5% absolute difference. If the drift exceeded 3 percent or 0.5%, the Calibration Error Test and System Bias were repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

If the diluent concentration at each traverse point did not differ more than 5 percent or 0.3% (whichever was less restrictive) of the average pollutant concentration, then single point sampling was conducted during the test runs. If the pollutant concentration did not meet these specifications but differed less than 10 percent or 0.5% from the average concentration, then three (3) point sampling was conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differed by more than 10 percent or 0.5% from the average concentration, then sampling was conducted at a minimum of twelve traverse points. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

Data Collection

A Data Acquisition System with battery backup was used to record the instrument response in one (1) minute averages. The data was continuously stored as a *.CSV file in Excel format on the hard drive of a computer. 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.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 25A

EPA Protocol 1 Calibration Gases

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.

Calibration Error Test and Response Time

Within two (2) hours prior to testing, zero gas was introduced through the sampling system to the analyzer. After adjusting the analyzer to the Zero gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas, and the time required for the analyzer reading to reach 95 percent of the gas concentration was recorded to determine the response time. Next, Low and Mid-Level gases were introduced through the sampling system to the analyzer, and the response was recorded when it was stable. All values were less than +/- 5 percent of the calibration gas concentrations.

Post Test Drift Checks

Mid Level gas was introduced through the sampling system. After the analyzer response was stable, the value was recorded. Next, Zero gas was introduced through the sampling system, and the analyzer value recorded once it reached a stable response. The Analyzer Drift was less than +/- 3 percent of the span value.

Data Collection

A Data Acquisition System with battery backup was used to record the instrument response in one (1) minute averages. The data was continuously stored as a *.CSV file in Excel format on the hard drive of a computer. 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.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 320

EPA Protocol 1 Calibration Gases – 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.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) was introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude was recorded, a background spectra was taken, a linearity check was performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest was measured and a screenshot was recorded.

Following the zero gas checks, room air was pulled through the sample chamber and the line width and resolution was verified to be at 1879 cm⁻¹, the peak position was entered and the FWHH was recorded (screenshot). Following these checks, another background spectra was recorded and the calibration transfer standard (CTS) was introduced directly to the instrument sample port. The CTS instrument recovery was recorded and the instrument mechanical response time was measured.

Next, stack gas was introduced to the FTIR through the sampling system and several scans were taken until a stable reading was achieved. The native concentration of our target spiking analytes (formaldehyde) was recorded. Spike gas was introduced to the sampling system at a constant flow rate $\leq 10\%$ of the total sample flow rate and a corresponding dilution ratio was calculated along with a system response time. Matrix spike recovery spectra were recorded and were within the $\pm 30\%$ of the calculated value of the spike concentration that the method requires.

The matrix spike recovery was conducted once at the beginning of the testing and the CTS recovery procedures were repeated following each test run. The corresponding values were recorded.