APEX COMPANIES, LLC

Air Emissions Report for FGDRYERS RTO and EUPRESSLINE Biofilter Relative Accuracy Test Audit at Weyerhaeuser Grayling, Michigan

Weyerhaeuser

Prepared for:
Weyerhaeuser
4111 West Four Mile Road
Grayling, Michigan 49378

State Registration No. B7302

Apex Project No. 22010373
January 10, 2023

Apex Companies, LLC
46555 Humboldt Drive, Suite 103
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Executive Summary

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The purpose of this testing was to perform a relative accuracy test audit (RATA) on certain continuous emissions monitoring systems (CEMS) as required by 40 CFR Part 60, Appendix F, "Quality Assurance Procedures," as incorporated in the permit. The following CEMS were evaluated:

- FGDRYERS RTO volatile organic compound (VOC) monitor
- FGDRYERS RTO carbon monoxide (CO) monitor
- EUPRESSLINE Biofilter VOC monitor

The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 4, 10, 25A, 205, and Performance Specifications (PS) PS-4, PS-6, and PS-8.

Detailed results are presented in Tables 1 through 3 after the Tables Tab of this report. The following tables summarize the results of the testing conducted on December 6 and 7, 2022.

Relative Accuracy Test Audit Results

Parameter	Average RM Result	Average CEMS Result	Difference between CEMS and RM	Relative Accuracy (%)	Performance Specification
FGDRYERS RTO					
VOC (lb/hr, as carbon)	2.99	2.80	0.19	2.2%	≤10% AS
CO (lb/hr)	111.73	99.01	12.71	14.3%	≤20% RM
EUPRESSLINE Biofilter					
VOC (lb/hr, as carbon)	10.82	10.23	0.59	8.4%	≤20% RM

CEMS: continuous emission monitoring system
lb/hr: pound per hour
RM: Reference Method
AS: Applicable Standard
VOC: volatile organic compound
CO: carbon monoxide

1.0 Introduction

1.1 Summary of Test Program

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The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 4, 10, 25A, 205, and Performance Specifications (PS) PS-4, PS-6, and PS-8.

Table 1-1 lists the emission sources tested, parameters, and test dates.

Table 1-1
Sources Tested, Parameters, and Test Dates

Source	Test Parameter	Test Date(s)
FGDRYERS RTO Outlet	VOC RATA, CO RATA	December 6, 2022
EUPRESSLINE Biofilter Outlet	VOC RATA	December 7, 2022

1.2 Key Personnel

The key personnel involved in this test program are listed in Table 1-2. Mr. David Kawasaki, Senior Engineer with Apex, led the emission testing program. Mr. Timothy Tadlock, Environmental Manager with Weyerhaeuser, provided process coordination and recorded operating parameters. Ms. Sharon LeBlanc, Mr. Jeremy Howe, and Mr. Dave Bowman, with EGLE, witnessed the testing and verified production parameters were recorded.

Table 1-2
Key Contact Information

Client	Apex
Timothy Tadlock Environmental Manager **Weyerhaeuser** 4111 West Four Mile Road Grayling, Michigan 49378 Phone: 989.348.3411 timothy.tadlock@weyerhaeuser.com	David Kawasaki, QSTI Senior Engineer **Apex Companies, LLC** 46555 Humboldt Drive, Suite 103 Novi, Michigan 48377 Phone: 248.590.5134 david.kawasaki@apexcos.com
EGLE	
Sharon LeBlanc Environmental Quality Analyst **Environment, Great Lakes, and Energy** **Air Quality Division** **Gaylord District Office** 2100 West M-32 Gaylord, Michigan 49735 Phone: 989.217.0055 leblancs@michigan.gov	

2.0 Source and Sampling Locations

2.1 Process Description

Weyerhaeuser manufactures oriented-strand board (OSB) at its facility in Grayling, Michigan. Wood logs are sorted by species and stored in the wood yard. The wood composition of boards manufactured during this testing event was 50% aspen, 5% basswood, 15% pine, 25% soft maple, and 5% hard maple. Logs are transferred to heated vats to clean and thaw (in winter months) the wood. The wood logs are conveyed from the vats to a debarking machine that removes the outer layers of the logs. A ring-strander cuts the logs into thin wood chips (strands). The strands are conveyed to a storage bin where they are fed into four wood-fired dyers. The dryers remove moisture from the strands to a product-specific content. The strands exit the dryers and are sorted according to size using shaker screens.

The fine strands are collected and used as fuel in the dryers and RTOs. The larger strands are conveyed to a blending area where wax and resins are added for adhesion purposes. The strands are then layered, at different angles for strength, onto an 8-foot-wide conveyor belt. The layered strands are cut into 8-foot-by-24-foot sections and formed into mats. The mats are stacked, and the press is used to heat and compact the strands to form OSB. Depending on the thickness of the product (i.e., 1/2 or 23/32 inch) up to 16 mats can be compacted in less than 4 minutes. The OSB is cut, labeled, and prepared for shipment.

2.2 Control Equipment Description

As part of the manufacturing process, emissions are generated by wood debarking and stranding, conveyance, drying, binding and pressing, milling, and painting (sides of wood). Weyerhaeuser operates pollution control equipment to control the discharge of pollutants to the atmosphere. The biofilter, wet electrostatic precipitator (WESP), and RTOs control emissions from the drying and pressing operations.

The VOC and CO CERMS installed on the FGDRYERS RTO exhaust stack and the VOC CERMS installed on the EUPRESSLINE Biofilter exhaust stack are used to evaluate continuous compliance with permit limits.

2.2.1 FGDRYERS RTOs

North and south RTOs are used to control VOC and hazardous air pollutant (HAP) emissions from four wood-fired strand dryers and a Coen® burner. Emissions from each dryer and the Coen® burner exhaust to a combined single-duct leading to a Lundberg E-Tube WESP. The WESP is designed to remove particulate matter from the flue gas prior to incineration by two RTOs.

At the RTOs, valves alternate the flow direction through each of the RTO chambers. Each chamber contains heat exchange media that alternately heat the emissions entering one combustion chamber and absorbs heat from the emissions exiting the other combustion chamber. Supplemental heat is supplied in the combustion chambers with a gas burner. An induced draft fan transports the emissions through the RTOs, which discharges to the atmosphere via the RTO stack (SVRTOSTACK).

Operating parameters were measured and recorded by Weyerhaeuser personnel during testing. Tables 2-1 and 2-2 summarize the operating conditions during testing of the FGDRYERS RTO. Additional operating parameter data are included in Appendix E.

Table 2-1
Summary of Production Data During RTO RATA

Test Run	Wood Processed (lb/hr)
1	104,335
2	117,266
3	119,419
4	118,124
5	120,978
6	117,588
7	117,588
8	120,377
9	119,602
10	123,388
11	128,850
12	124,306
Average	**117,866**

Table 2-2
Summary of RTO Operating Data

Test Run	RTO #1 Temperature (°F)	RTO #2 Temperature (°F)
1	1,561	1,553
2	1,579	1,547
3	1,574	1,542
4	1,554	1,547
5	1,553	1,546
6	1,564	1,516
7	1,564	1,516
8	1,559	1,548
9	1,557	1,550
10	1,611	1,573
11	1,602	1,527
12	1,636	1,544
Average	**1,567**	**1,544**

2.2.2 EUPRESSLINE Biofilter

The biofilter controls VOC and HAP emissions from the press portion of emission unit EUPRESSLINE. The press heats and compacts alternating layers of fine and coarse wood strands and binders into the OSB. Emissions from the press are captured within the total building enclosure and directed to a humidifier followed by a two-chamber biofilter. The biofilter contains Douglas fir mulch that provides a microbial environment for pollutant removal. Treated emissions from the two biofilter chambers discharge to a single stack (SVBIOFILTER).

Operating parameters were measured and recorded by Weyerhaeuser personnel during testing. Tables 2-3 and 2-4 summarize the operating conditions during testing of the EUPRESSLINE Biofilter. Additional operating parameter data are included in Appendix E.

Table 2-3
Summary of Production Data During Biofilter RATA

RATA Test Run	Average Press Feed Line Speed (ft/min)	Board Thickness (inch)
1	125	1/2
2	125	1/2
3	124	1/2
4	122	1/2
5	119	1/2
6	118	1/2
7	118	1/2
8	120	1/2
9	118	1/2
Average	**121**	-

Table 2-4
Summary of Biofilter Operating Data

Test Run	North Bed Temperature (°F)	South Bed Temperature (°F)
1	88.63	84.99
2	88.01	84.99
3	87.90	84.42
4	88.07	84.98
5	88.20	85.10
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RATA Test Run	Average Press Feed Line Speed (ft/min)	Board Thickness (inch)
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Test Run	North Bed Temperature (°F)	South Bed Temperature (°F)
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6	88.31	85.12
7	88.47	85.31
8	88.59	85.34
9	88.69	85.48
Average	**88.32**	**85.08**

2.3 Flue Gas Sampling Locations

2.3.1 FGDRYERS RTO Outlet Sampling Location

Four sampling ports oriented at 90° to one another are located in a straight section of a 105-inch-internal-diameter duct. The sampling ports are located:

- Approximately 40 feet (4.6 duct diameters) from the nearest downstream disturbance.
- Approximately 30 feet (3.4 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via elevator to the top floor of the FGDRYER building and stairs to a catwalk. A photograph of the FGDRYERS RTO outlet sampling location is presented in Figure 2-1. Figure 1 in the Appendix depicts the FGDRYERS RTO outlet sampling ports and traverse point locations.

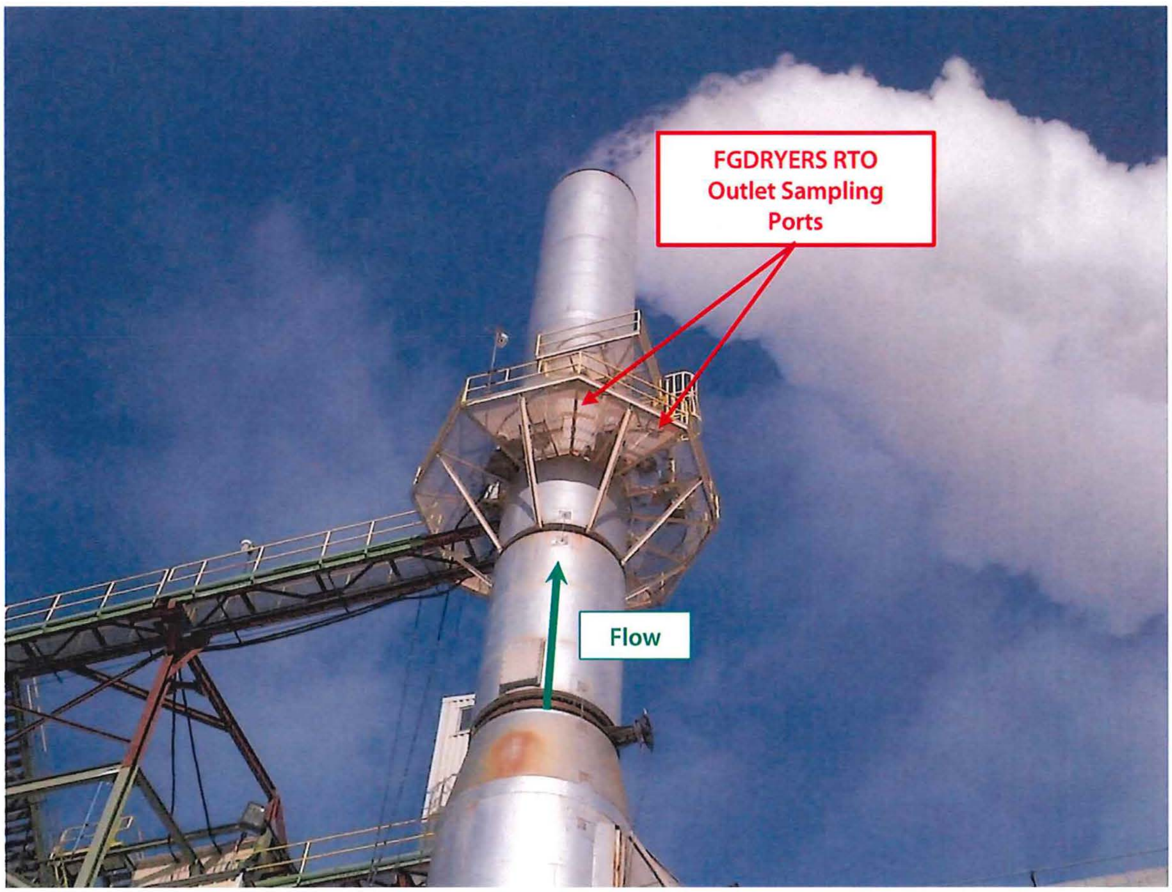


Figure 2-1. FGDRYERS RTO Outlet Sampling Location

2.3.2 EUPRESSLINE Biofilter Outlet Sampling Location

Two sampling ports oriented at 90° to one another are located in a straight section of an 84-inch-internal-diameter duct. The sampling ports are located:

- Approximately 60 feet (8.6 duct diameters) from the nearest downstream disturbance.
- Approximately 70 feet (10 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via grating above the control room housing the Biofilter CEMS and CERMS equipment. A photograph of the EUPRESSLINE Biofilter outlet sampling location is presented in Figure 2-2. Figure 2 in the Appendix depicts the EUPRESSLINE Biofilter outlet sampling ports and traverse point locations.

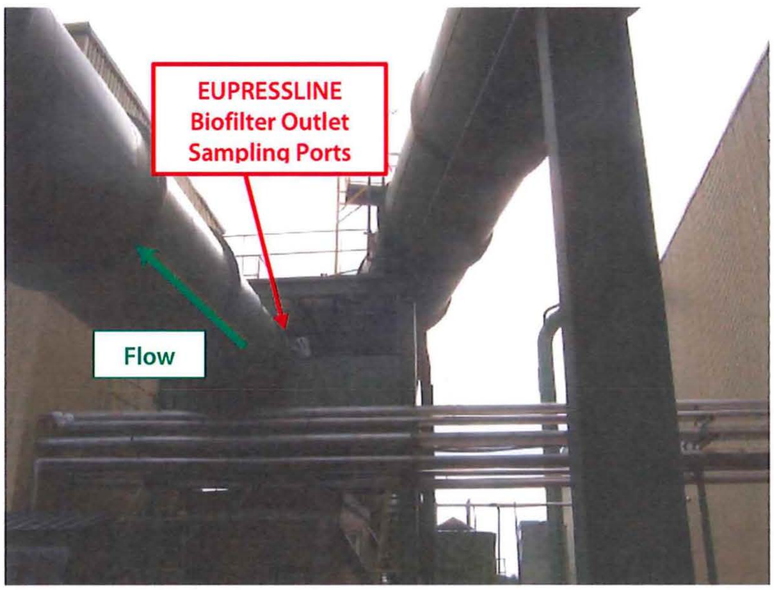


Figure 2-2. EUPRESSLINE Biofilter Inlet and Outlet Sampling Locations

2.4 Process Sampling Locations

Process sampling was not required during this test program. A process sample is a sample that is analyzed for operational parameters, such as calorific value of a fuel (e.g., natural gas, coal), organic compound content (e.g., paint coatings), or composition (e.g., polymers).

2.5 Continuous Emission Rate Monitoring Systems

Description and identification of the instrumentation operated by Weyerhaeuser to monitor source emission rates are presented in Sections 2.5.1 and 2.5.2.

2.5.1 FGDRYERS RTO Outlet

The VOC monitor is a California Analytical Instruments, Inc., Model 600 HFID, Serial Number B05009. The system extracts sample gas through a heated sample probe and heated filter connected to the monitor by a heated sample line. The VOC analyzer measures total hydrocarbons using a flame ionization detector (FID). The VOC monitor operates on a dual range span: 0 to 100 parts per million (ppm) and 0 to 1,000 ppm.

The CO monitor is a California Analytical Instruments, Inc., Model 601, Serial Number B06014-M. The system extracts sample gas through a heated sample probe and heated filter connected to the gas conditioning system by a heated sample line. Moisture is removed from the sample before the sample is analyzed. The CO analyzer measures carbon monoxide concentration by non-dispersive infrared analysis. The analyzer has a span of 0 to 1,000 ppm.

The flowrate monitor is a Teledyne UltraFlow Model 150, Serial Number 1501354. The air flowrate is measured by ultrasonic methods. The flowrate monitoring system uses 20% oxygen and 1% carbon dioxide for the flowrate calculations.

2.5.2 EUPRESSLINE Biofilter Outlet

The VOC monitor is a California Analytical Instruments, Inc., Model 600 HFID, Serial Number B05010. The system extracts sample gas through a heated sample probe and heated filter connected to the monitor by a heated sample line. The VOC analyzer measures total hydrocarbons using a FID. The VOC monitor operates on a single range/span of 0 to100 ppm.

The flowrate monitor is a Teledyne UltraFlow Model 150, Serial Number 1501355. The air flowrate is measured by ultrasonic methods. The flow monitoring system uses 20% oxygen and 0% carbon dioxide for the flowrate calculations.

3.0 Summary and Discussion of Results

3.1 Objectives and Test Matrix

The purpose of this testing was to perform a RATA on certain CEMS as required by 40 CFR Part 60, Appendix F, "Quality Assurance Procedures," as incorporated in the permit.

Table 3-1 summarizes the sampling and analytical matrix.

Table 3-1
Sampling and Analytical Matrix

Sampling Location	Sample/Type of Pollutant	Sample Method	Date (2022)	Run	Start Time	End Time	Analytical Laboratory
FGDRYERS RTO	Flowrate, molecular weight, moisture content, CO RATA, VOC RATA	USEPA 1-4, 10, 25A, 205, PS-4, PS-6, PS-8	Dec. 6	1	0810	0831	Not applicable
				2	0832	0853	
				3	0854	0915	
				4	0928	0949	
				5	1006	1027	
				6	1028	1049	
				7	1300	1321	
				8	1322	1343	
				9	1344	1405	
				10	1416	1437	
				11	1438	1459	
				12	1500	1521	
EUPRESSLINE Biofilter	Flowrate, molecular weight, moisture content, VOC RATA	USEPA 1-4, 25A, 205, PS-6, PS-8	Dec. 7	1	0735	0756	Not applicable
				2	0756	0817	
				3	0817	0838	
				4	0844	0905	
				5	0905	0926	
				6	0926	0947	
				7	0952	1013	
				8	1013	1034	
				9	1034	1055	

3.2 Field Test Changes and Issues

Communication between Weyerhaeuser, Apex, and EGLE allowed the testing to be completed as proposed in the October 13, 2022, Intent-to-Test Plan.

3.3 Summary of Results

The results of testing are presented in Table 3-2. Detailed results are presented in the Appendix Tables 1 through 3 after the Tables Tab of this report. Graphs are presented after the Graphs Tab of this report. Sample calculations are presented in Appendix B.

Table 3-2
Relative Accuracy Test Audit Results

Parameter	Average RM Result	Average CEMS Result	Difference between CEMS and RM	Relative Accuracy (%)	Performance Specification
FGDRYERS RTO					
VOC (lb/hr, as carbon)	2.99	2.80	0.19	2.2%	≤10% AS
CO (lb/hr)	111.73	99.01	12.71	14.3%	≤20% RM
EUPRESSLINE Biofilter					
VOC (lb/hr, as carbon)	10.82	10.23	0.59	8.4%	≤20% RM

CEMS: continuous emission monitoring system
lb/hr: pound per hour
RM: Reference Method
AS: Applicable Standard
VOC: volatile organic compound
CO: carbon monoxide

4.0 Sampling and Analytical Procedures

Apex measured emissions in accordance with USEPA sampling methods. Table 4-1 presents the emissions test parameters and sampling methods.

Table 4-1
Emission Testing Methods

Parameter	FGDRYERS RTO	EUPRESSLINE Biofilter	USEPA Reference	
			Method	Title
Sampling ports and traverse points	•	•	1	Sample and Velocity Traverses for Stationary Sources
Velocity and flowrate	•	•	2	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
Molecular weight	•	•	3	Gas Analysis for the Determination of Dry Molecular Weight
Moisture content	•	•	4	Determination of Moisture Content in Stack Gases
Carbon monoxide (CO)	•		10	Determination of Carbon Monoxide Emissions from Stationary Sources (Instrument Analyzer Procedure)
Volatile organic compounds (VOC)	•	•	25A	Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer
Gas dilution	•	•	205	Verification of Gas Dilution Systems for Field Instrument Calibrations
CO RATA	•		PS-4	Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources
Flow RATA	•	•	PS-6	Specifications and Test Procedures for Continuous Emission Rate Monitoring Systems in Stationary Sources
VOC RATA	•	•	PS-8	Specifications and Test Procedures for Volatile Organic Compound Continuous Emission Monitoring Systems in Stationary Sources

4.1 Emission Test Methods

4.1.1 Volumetric Flowrate (USEPA Methods 1 and 2)

USEPA Method 1, "Sample and Velocity Traverses for Stationary Sources," was used to evaluate the sampling locations and the number of traverse points for sampling. Figures 1 and 2 in the Appendix depict the source locations and traverse points.

USEPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)," was used to measure flue gas velocity and calculate volumetric flowrates. S-type Pitot tubes and thermocouple assemblies, calibrated in accordance with Method 2, Section 10.0, were used during testing. Because the dimensions of the Pitot tubes met the requirements outlined in Method 2, Section 10.1, and are within the specified limits, the baseline Pitot tube coefficient of 0.84 (dimensionless) was assigned. The digital manometer and thermometer are calibrated using calibration standards that are traceable to National Institute of Standards and Technology (NIST). Pitot tube inspection sheets are included in Appendix A.

Cyclonic Flow Check. Apex has evaluated whether cyclonic flow was present at the sampling locations during previous testing. Cyclonic flow is defined as a flow condition with an average null angle greater than 20°. The direction of flow can be determined by aligning the Pitot tube to obtain zero (null) velocity head reading—the direction would be parallel to the Pitot tube face openings or perpendicular to the null position. By measuring the angle of the Pitot tube face openings in relation to the stack walls when a null angle is obtained, the direction of flow is measured. If the absolute average of the flow direction angles is greater than 20°, the flue gas is considered to be cyclonic at that sampling location and an alternative location should be selected.

The averages of the measured traverse point flue gas velocity null angles, during previous testing, were less than 20° at the sampling locations. The measurements indicate the absence of cyclonic flow.

Field data sheets are included in Appendix C. Computer-generated field data sheets are included in Appendix D.

4.1.2 Molecular Weight (USEPA Method 3)

USEPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight," was used to determine the molecular weight of the flue gas. Flue gas was extracted from the stack through a probe and directed into a Fyrite® gas analyzer. The concentrations of carbon dioxide (CO_2) and oxygen (O_2) were measured by chemical absorption to within ±0.5%. The average CO_2 and O_2 results of the grab samples were used to calculate molecular weight.

4.1.3 Moisture Content (USEPA Method 4)

USEPA Method 4, "Determination of Moisture Content in Stack Gases" was used to determine the moisture content of the flue gas. Refer to Figure 4-1 for a drawing of the USEPA Method 4 sampling train.

Apex's modular USEPA Method 4 stack sampling system consists of:

- A stainless steel probe.
- Tygon® umbilical line connecting the probe to the impingers.
- A set of four impingers with the configuration shown in Table 4-2.
- A sampling line.
- An Environmental Supply® control case equipped with a pump, dry-gas meter, and calibrated orifice.

Table 4-2
USEPA Method 4 Impinger Configuration

Impinger Order (Upstream to Downstream)	Impinger Type	Impinger Contents	Contents
1	Modified	Water	~100 grams
2	Greenburg Smith	Water	~100 grams
3	Modified	Empty	0 grams
4	Modified	Silica desiccant	~300 grams

Prior to initiating a test run, the sampling train was leak-checked by capping the probe tip and applying a vacuum of approximately 10 inches of mercury to the sampling train. The dry-gas meter was monitored for approximately 1 minute to verify the sample train leak rate was less than 0.02 cfm. The sample probe was then inserted into the sampling port near the centroid of the stack in preparation of sampling. Flue gas was extracted at a constant rate from the stack, with moisture removed from the sample stream by the chilled impingers.

At the conclusion of the test run, a post-test leak check was conducted and the impinger train was carefully disassembled. The weight of liquid or silica gel in each impinger was measured with a scale capable of measuring to the nearest 0.5 gram. The weight of water collected within the impingers and volume of flue gas sampled were used to calculate the percent moisture content. One moisture content sample was collected during each test run.

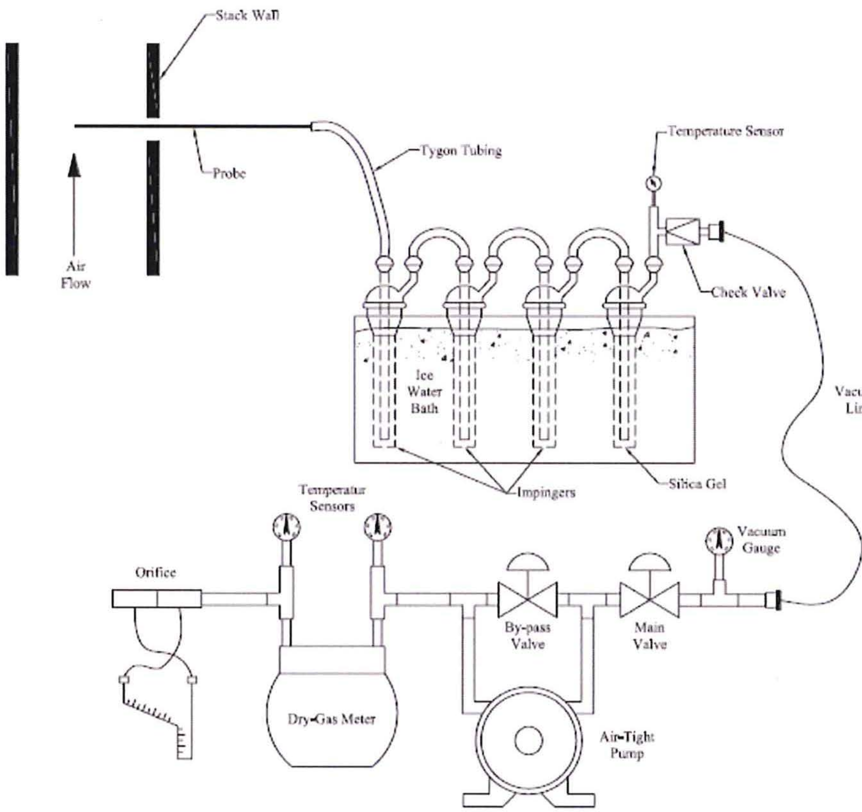


Figure 4-1. USEPA Method 4 Sampling Train

4.1.4 Carbon Monoxide (USEPA Method 10)

USEPA Method 10 "Determination of Carbon Monoxide Emissions from Stationary Sources (Instrument Analyzer Procedure)" was used to measure CO concentrations. Flue gas was continuously sampled from the stack and conveyed to an infrared analyzer for CO concentration measurements.

Flue gas was extracted from the stack through:

- A stainless-steel probe.
- Heated Teflon sample line to prevent condensation.
- A chilled Teflon impinger train (equipped with a peristaltic pump) to remove moisture from the sampled gas stream prior to entering the analyzer.
- CO analyzer.

Figure 4-2 depicts the USEPA Method 10 sampling train. Data was recorded at 1-second intervals on a computer equipped with data acquisition software. Recorded concentrations were averaged over the duration of each test run.

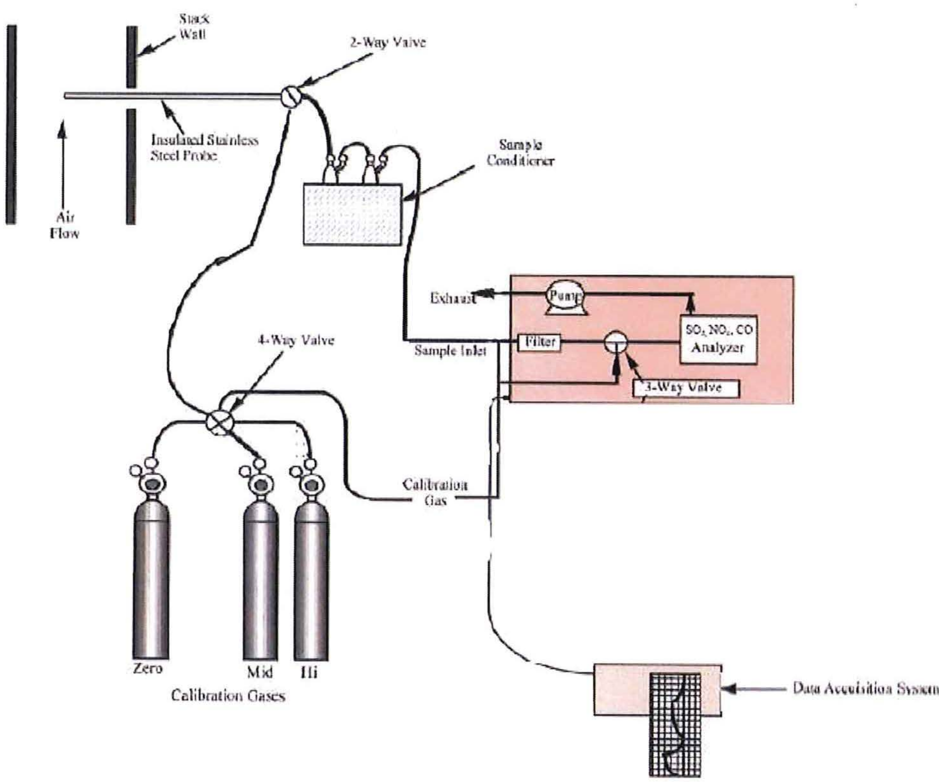


Figure 4-2. USEPA Method 10 Sampling Train

A 3-point stratification test from previous testing determined the minimum number of traverse points to be sampled.

The pollutant concentrations were measured using an analyzer calibrated with zero-, mid-, and high-USEPA-Traceability-Protocol-certified calibration gases. The mid-level gas was 40 to 60% of the high-level (also referred to as span) gas.

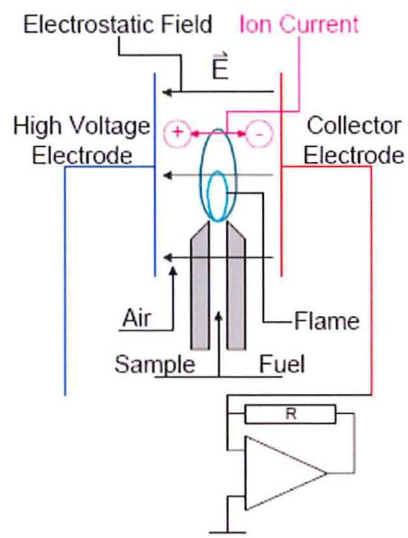
Calibration Error Check. A calibration error check was performed by introducing zero-, mid-, and high-level calibration gases directly into the analyzer. The calibration error check was performed to verify the analyzer response was within ±2% of the certified calibration gas introduced.

System Bias Test. Prior to each test run, a system bias test was performed where known concentrations of calibration gases were introduced at the probe tip to measure if an analyzer's response was within ±5% of the introduced calibration gas concentrations. At the conclusion of each test run, an additional system-bias check was performed to evaluate the analyzer drift from pre- and post-test system-bias checks. The system-bias check evaluates the analyzer drift against the ±3% quality assurance/quality control (QA/QC) requirement.

The analyzer drift data was used to correct the measured flue gas concentrations. Recorded concentrations were averaged over the duration of each test run.

4.1.5 Total Hydrocarbons (USEPA Method 25A)

USEPA Method 25A, "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer," was used to measure volatile organic compound concentrations in the flue gas. Samples were collected through a stainless steel probe and heated sample line into an analyzer.



A FID determines the average hydrocarbon concentration in part per million by volume (ppmv) of VOC as the calibration gas (i.e., propane). The FID is fueled by 100% hydrogen, which generates a flame with a negligible number of ions. Flue gas is introduced into the FID and enters the flame chamber. The combustion of flue gas generates electrically charged ions. The analyzer applies a polarizing voltage between two electrodes around the flame, producing an electrostatic field. Negatively charged ions, anions, migrate to a collector electrode, while positively charged ions, cations, migrate to a high-voltage electrode. The current between the electrodes is directly proportional to the hydrocarbon concentration in the sample. The flame chamber is depicted at right.

Using the voltage analog signal, measured by the FID, the concentration of VOCs was recorded by a data acquisition system (DAS). The average concentration of VOCs is reported as the calibration gas (i.e., propane) in equivalent units.

Before testing, the analyzer was calibrated by introducing a zero-calibration range gas (<1% of span value) and high-calibration range gas (80-90% span value) to the tip of the sampling probe. Next, a low-calibration range gas (25-35% of span value) and mid-calibration range gas (45-55% of span value) were introduced. The analyzers are considered to be calibrated when the analyzer response is ±5% of the calibration gas value.

A 3-point stratification test from previous testing determined the minimum number of traverse points to be sampled.

At the conclusion of a test run, a calibration drift test was performed by introducing the zero- and mid-calibration gas to the tip of the sampling probe. The test run data was considered valid if the calibration drift test demonstrated the analyzers are responding within 3% of the calibration span from pre-test to post-test calibrations.

Figure 4-3 depicts the USEPA Method 25A sampling train.

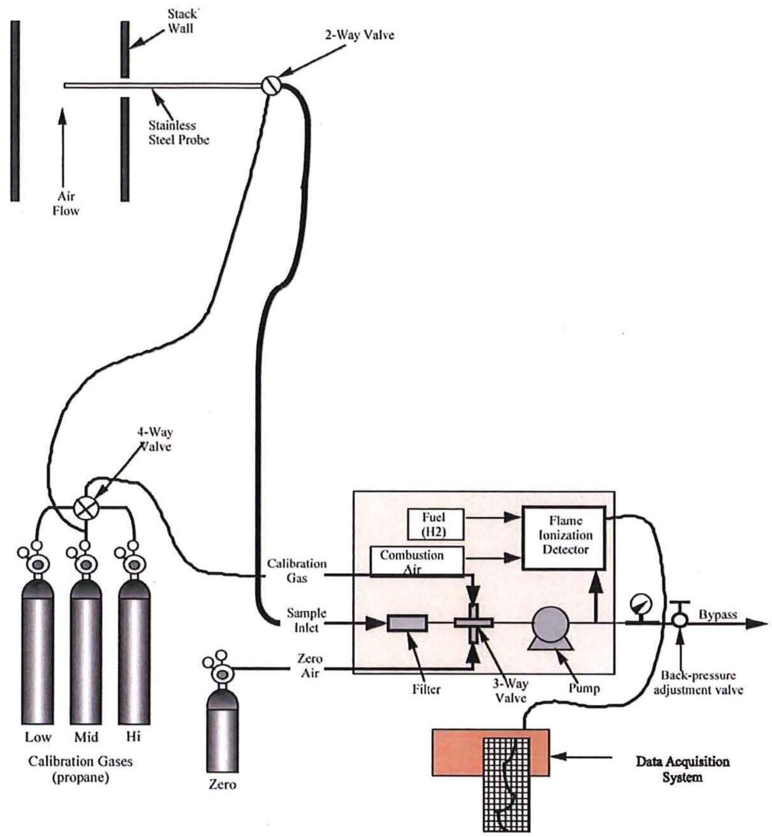


Figure 4-3. USEPA Method 25A Sampling Train

4.1.6 Gas Dilution (USEPA Method 205)

USEPA Method 205, "Verification of Gas Dilution Systems for Field Instrument Calibrations," was used to introduce known values of calibration gases into the analyzers. The gas dilution system consists of calibrated orifices or mass flow controllers and dilutes a high-level calibration gas to within ±2% of predicted values. The gas divider is capable of diluting gases at set increments and was evaluated for accuracy in the field in accordance with USEPA Method 205.

Prior to testing, the gas divider dilutions were measured to evaluate that they were within ±2% of predicted values. Two sets of three dilutions of the high-level calibration gas were performed. In addition, a certified mid-level calibration gas was introduced into an analyzer; this calibration gas concentration was within ± 10% of a gas divider dilution concentration.

4.2 Process Data

Weyerhaeuser recorded process data during testing. EGLE personnel verified the requested operating and process data were recorded. Process data are included in Appendix E.

5.0 Quality Assurance and Quality Control

5.1 QA/QC Procedures

Equipment used in this emissions test program passed Quality Assurance (QA) and Quality Control (QC) procedures. Refer to Appendix A for equipment calibrations. Before testing, the sampling equipment was cleaned, inspected, and calibrated according to procedures outlined in the applicable USEPA sampling method and USEPA's "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods."

5.2 QA/QC Audits

Onsite QA/QC procedures (i.e., Pitot tube inspections, nozzle size verifications, leak check, calculation of isokinetic sampling rates, calibrations) were performed in accordance with the respective USEPA sampling methods. Equipment inspection and calibration measurements are presented in Appendix A.

Offsite QA audits include dry-gas meter and thermocouple calibrations.

5.2.1 Sampling Train QA/QC

The sampling trains described in Section 4.1 were audited for measurement accuracy and data reliability. Table 5-1 summarizes the QA/QC audits conducted on each sampling train.

Table 5-1
USEPA Method 4 Sampling Train QA/QC

Parameter	Run 1	Run 2	Run 3	Run 4	Method Requirement	Comment
FGDRYERS RTO						
Sampling train post-test leak check	0 ft^3 for 1 min at 5 in Hg	0 ft^3 for 1 min at 5 in Hg	0 ft^3 for 1 min at 5 in Hg	0 ft^3 for 1 min at 5 in Hg	<0.020 ft^3 for 1 minute at a vacuum ≥ recorded during test	Valid
Sampling vacuum (in Hg)	1	1	1	1		
EUPRESSLINE Biofilter						
Sampling train post-test leak check	0 ft^3 for 1 min at 5 in Hg	0 ft^3 for 1 min at 5 in Hg	0 ft^3 for 1 min at 5 in Hg	N/A	<0.020 ft^3 for 1 minute at a vacuum ≥ recorded during test	Valid
Sampling vacuum (in Hg)	1	1	1	N/A		

5.2.2 Instrument Analyzer QA/QC

The instrument analyzer sampling trains described in Section 4.1 were audited for measurement accuracy and data reliability. The analyzers passed the applicable calibration criteria. Table 5-2 summarizes the gas cylinders used during this test program. Analyzer calibration, bias, and drift data are included in Appendix A.

Table 5-2
Calibration Gas Cylinder Information

Parameter	Gas Vendor	Cylinder Serial Number	Cylinder Value	Expiration Date
Nitrogen	Airgas	W470365	99.9995%	02/06/2026
Carbon monoxide	Airgas	SG9140178BAL.	906.8 ppm	06/27/2055
Carbon monoxide	Airgas	XC014125B	81.49 ppm	01/06/2023
Air	Airgas	AAL-13128	--	12/06/2029
Propane	Airgas	ALM008620	85.42 ppm	05/09/2026

5.2.3 Dry-Gas Meter QA/QC

Table 5-3 summarizes the dry-gas meter calibration checks in comparison to the acceptable USEPA tolerance. Complete dry-gas meter calibrations are included in Appendix A.

Table 5-3
Dry-Gas Meter Calibration QA/QC

Dry-Gas Meter	Pre-test DGM Calibration Factor	Post-test DGM Calibration Factor	Difference Between Pre- and Post-test Calibrations	Acceptable Tolerance	Comment
X	1.021 (07/07/2022)	0.991 (12/20/2022)	0.030	±0.05	Valid

5.2.4 Thermocouple QA/QC

Temperature measurements using thermocouples and digital pyrometers were compared to a reference temperature prior to testing to evaluate accuracy of the equipment. The thermocouples and pyrometers measured temperature within ±1.5% of the reference temperatures and were within USEPA acceptance criteria. Thermocouple calibration sheets are included in Appendix A.

5.3 Data Reduction and Validation

The emissions testing Project Manager and/or the QA/QC Officer validated computer spreadsheets. The computer spreadsheets were used to ensure that field calculations were accurate. Random inspection of the field data sheets were conducted to verify data have been recorded appropriately. At the completion of a test, the raw field data were entered into computer spreadsheets to provide applicable onsite emissions calculations. The computer data were checked against the raw field sheets for accuracy during review of the report.

5.4 QA/QC Problems

Equipment audits and QA/QC procedures demonstrate sample collection accuracy and compliance for the test runs.

6.0 Limitations

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