RECEIVED
OCT 21 2024
EGLE - Mailroom

Alliance
TECHNICAL GROUP

Source Test Report

Arauco North America
5851 Arauco Road
Grayling, Michigan 49738

Source Tested: Board Press Exhaust Stack
Test Date: August 22, 2024

Project No. AST-2024-3437

Prepared By
Alliance Technical Group, LLC
107 Center Lane,
Huntersville, NC 28078

Regulatory Information

Permit No.	Michigan Department of Environment, Great Lakes and Energy (EGLE) Air Quality Permit PTI-59-16H
Regulatory Citation	40 CFR 63, Subpart A 40 CFR 63, Subpart DDDD

Source Information

Source Name	*Source ID*	*Target Parameter(s)*
Continuous Board Press Wet Scrubber	WS01	PCWP HAPS

Contact Information

Test Location
Arauco North America
5851 Arauco Road
Grayling, Michigan 49738

Facility Contact
James Osga
james.osga@arauco.com
(938) 344-2881

Test Company
Alliance Technical Group, LLC
107 Center Lane
Huntersville, NC 28078

Operations Manager
Quentin Best
quentin.best@alliancetg.com
(704) 309-7421

Field Team Leader
Andrew Dickson
andrew.dickson@alliancetg.com
(704) 618-1144

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

Report Coordinator
Sean Coyle
sean.coyle@alliancetg.com
(256) 351-0121

Report Reviewer
Kimberly Dyehouse
kimberly.dyehouse@alliancetg.com
(812) 452-4785

Analytical Laboratory
Air Compliance Environmental
7029 Oviedo Drive
Raleigh, NC 27603

Ron McCulloch
ron.mcculoch@aircompliance.us
(919) 885-4975

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.

Quentin Best – Operations Manager
Alliance Technical Group, LLC

10/8/2024
Date

TABLE OF CONTENTS

1.0 Introduction 1-1
1.1 Facility and Source Description 1-1
1.2 Project Team 1-1
1.3 Site Specific Test Plan & Notification 1-1
2.0 Summary of Results 2-1
3.0 Testing Methodology 3-1
3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate 3-1
3.2 U.S. EPA Reference Test Method 2, Section 8.6 – Oxygen/Carbon Dioxide 3-1
3.3 U.S. EPA Reference Test Method Alternative -004 – Dry-Bulb Wet-Bulb 3-1
3.4 U.S. EPA Reference Test Method 320 – PCWP Hazardous Air Pollutants 3-1
3.5 Quality Assurance/Quality Control – U.S. EPA Reference Method 320 3-2

LIST OF TABLES

Table 1-1: Project Team 1-1
Table 2-1: Summary of Results 2-1
Table 3-1: Source Testing Methodology 3-1

APPENDICES

Appendix A Sample Calculations
Appendix B Field Data
Appendix C Laboratory Data
Appendix D Quality Assurance/Quality Control Data
Appendix E Process Operating/Control System Data
Appendix F SSTP and Associated Documentation

Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Arauco North America (Arauco) to conduct compliance testing at the Grayling, Michigan facility. Portions of the facility are subject to 40 CFR 63, Subpart A and for National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR 63 Subpart DDDD for plywood and composite wood products (PCWP) Maximum Achievable Control Technology (MACT) standards, and operates under Michigan Department of Environment, Great Lakes and Energy (EGLE) Air Quality Permit PTI-59-16H Testing was conducted to determine the emission rates of plywood composite wood products (PCWP) hazardous air pollutants (HAPs) at the exhaust of the wet scrubber (WS01) serving the particleboard press and board cooler.

1.1 Facility and Source Description

Arauco North America, Inc. in Grayling, Michigan is a composite wood products facility producing particleboard panels for the building industry. In the manufacturing of particleboard, the facility utilizes several process lines including debarking, flaking, flake dryers, screening, blending, forming, a continuous press, and multiple sawing and cutting operations. Thermal energy for production is produced by the Thermal Energy Plant. The Thermal Energy Plant combusts wood derived fuel such as sander dust, fines from screening and biomass from debarking operations. The target emission units for the FGDRYERRTO are EUFLAKERS, EUDRYER1, EUDRYER2 and EUENERGY. The target emission units for the FGPRESSCOOL are EUPRESS and EUCOOLER.

1.2 Project Team

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

Table 1-1: Project Team

Facility Personnel	Jim Osga
Regulatory Personnel	Andrew Riley
Alliance Personnel	Andrew Dickson Jim Lewis

1.3 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site-Specific Test Plan (SSTP) submitted to EGLE on May 9, 2024.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the Arauco facility in Grayling, Michigan on August 22, 2024. Testing consisted of determining the emission rates of HAPS at the exhaust of WS01.

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

Table 2-1: Summary of Results

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	8/22/24	8/22/24	8/22/24	--
Acetaldehyde Data				
Concentration, ppmvd	0.00	0.00	0.00	0.00
Concentration, ppmvw	0.00	0.00	0.00	0.00
Emmission Rate, lb/hr	0.00	0.00	0.00	0.00
Acrolein Data				
Concentration, ppmvd	0.00	0.00	0.00	0.00
Concentration, ppmvw	0.00	0.00	0.00	0.00
Emmission Rate, lb/hr	0.00	0.00	0.00	0.00
Formaldehyde Data				
Concentration, ppmvd	11.72	11.52	11.49	11.58
Concentration, ppmvw	11.17	10.99	10.96	11.04
Emmission Rate, lb/hr	4.00	3.98	3.91	3.96
Methanol Data				
Concentration, ppmvd	20.25	19.74	19.87	19.95
Concentration, ppmvw	19.30	18.83	18.96	19.03
Emmission Rate, lb/hr	7.36	7.27	7.21	7.28
Phenol Data				
Concentration, ppmvd	0.00	0.00	0.00	0.00
Concentration, ppmvw	0.00	0.00	0.00	0.00
Emmission Rate, lb/hr	0.00	0.00	0.00	0.00
Propionaldehyde Data				
Concentration, ppmvd	1.94	1.88	1.76	1.86
Concentration, ppmvw	1.85	1.79	1.68	1.77
Emmission Rate, lb/hr	1.28	1.25	1.16	1.23

Emissions Data				
Run Number	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	8/22/24	8/22/24	8/22/24	--
Combined PCWP HAPs Data				
Emission Rate, lb/hr	12.64	12.51	12.28	12.48
Production Rate, MSF/hr	57.04	56.62	56.62	56.76
Emission Rate lb/MSF	0.22	0.22	0.22	0.22
NESHAP Limit, lb/MSF	--	--	--	0.31
Percent of Limit, %	--	--	--	71 %

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 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	2 (Section 8.6)	Assigned Molecular Weight
Moisture Content	Alt-004	Dry-Bulb Wet-Bulb
HAPS	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 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

3.2 U.S. EPA Reference Test Method 2, Section 8.6 – Oxygen/Carbon Dioxide

U.S. EPA Reference Test Method 2, Section 8.6 states, "For processes emitting essentially air, an analysis needs not be conducted; use a dry molecular weight of 29.0." The emission source associated with this process emits essentially air, therefore the emission rate calculations were based on a dry molecular weight of 29.0

3.3 U.S. EPA Reference Test Method Alternative -004 – Dry-Bulb Wet-Bulb

The gas moisture content was determined by using a psychrometric chart and measuring the dry bulb/wet bulb temperatures. One (1) temperature measurement was conducted during each velocity traverse.

3.4 U.S. EPA Reference Test Method 320 – PCWP Hazardous Air Pollutants

The concentrations of Acetaldehyde, Acrolein, Formaldehyde, Methanol, Phenol, and Propionaldehyde 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 MKS MultiGas 2030 or CAI 600 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 3.5.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference 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 surrogate spiking analytes formaldehyde and methanol were 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.

Appendix A

Location: Arauco North America - Grayling, MI
Source: Press Exhaust Stack
Project No.: AST-2024-3437
Run No. /Method Run 1 / Method 320

Formaldehyde Concentration (C_{CH2O}), ppmvd

$$C_{CH2O} = \frac{C_{CH2Ow}}{1 - BWS}$$

where,

C_{CH2Ow}	11.2	= Formaldehyde Concentration, ppmvw
BWS	0.047	= moisture fraction, unitless
C_{CH2O}	11.7	= ppmvd

Formaldehyde Emission Rate (ER_{CH2O}), lb/hr

$$ER_{CH2O} = \frac{C_{CH2O} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 454 \frac{g}{lb}}$$

where,

C_{CH2O}	11.7	= Formaldehyde Concentration, ppmvd
MW	30.03	= CH2O molecular weight, g/g-mole
Qs	72,839	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{CH2O}	4.00	= lb/hr

Location	**Arauco North America - Grayling, MI**
Source	**Press Exhaust Stack**
Project No.	**AST-2024-3437**
Run No.	**1**
Parameter(s)	**VFR**

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	28.54	= barometric pressure, in. Hg
Pg	-0.70	= static pressure, in. H_2O
Ps	28.49	= in. Hg

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37-\left(\frac{2,827}{Ts+365}\right)}}{Ps}$$

where,

Ts	97.4	= stack temperature, °F
Ps	28.5	= absolute stack gas pressure, in. Hg
BWSsat	0.062	= dimensionless

Moisture Fraction (BWS), dimensionless

$$BWS = BWSmsd \text{ unless } BWSsat < BWSmsd$$

where,

BWSsat	0.062	= moisture fraction (theoretical at saturated conditions)
BWSmsd	--	= moisture fraction (measured)
BWS	0.047	

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md\ (1 - BWS) + 18.015\ (BWS)$$

where,

Md	29.00	= molecular weight (DRY), lb/lb mol
BWS	0.047	= moisture fraction, dimensionless
Ms	28.48	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})\,avg \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.82	= pitot tube coefficient
$\Delta P^{1/2}$	1.239	= average pre/post test velocity head of stack gas, $(in.\ H_2O)^{1/2}$
Ts	557.1	= average pre/post test absolute stack temperature, °R
Ps	28.49	= absolute stack gas pressure, in. Hg
Ms	28.48	= molecular weight of stack gas, lb/lb mol
Vs	72.0	= ft/sec

Location Arauco North America - Grayling, MI
Source Press Exhaust Stack
Project No. AST-2024-3437
Run No. 1
Parameter(s) VFR

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	72.0	= stack gas velocity, ft/sec
As	19.63	= cross-sectional area of stack, ft^2
Qa	84,786	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qsd = 17.636 \times Qa \times (1 - BWS) \times \frac{Ps}{Ts}$$

where,

Qa	84,786	= average stack gas flow at stack conditions, acfm
BWS	0.047	= moisture fraction, dimensionless
Ps	28.49	= absolute stack gas pressure, in. Hg
Ts	557.1	= average pre/post test absolute stack temperature, °R
Qs	72,839	= dscfm

Appendix B

Alliance TECHNICAL GROUP

Location Arauco North America - Grayling, MI
Source Press Exhaust Stack
Project No. AST-2024-3437

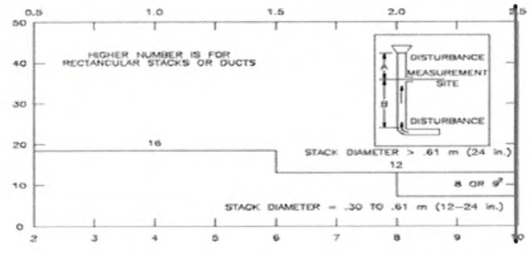
Run Number		Run 1	Run 2	Run 3	Average
Date		8/22/24	8/22/24	8/22/24	--
Start Time		8:56	10:00	11:05	--
Stop Time		9:56	11:00	12:05	--
Input Data - Outlet					
Moisture Fraction, dimensionless	BWS	0.047	0.046	0.046	0.046
Volumetric Flow Rate (M1-4), dscfm	Qs	72,839	73,819	72,693	73,117
FTIR Calculated Data					
Acetaldehyde Concentration, ppmvd	C_{C2H4O}	0.00	0.00	0.00	0.00
Acetaldehyde Concentration, ppmvw	C_{C2H4Ow}	0.00	0.00	0.00	0.00
Acetaldehyde Emission Rate, lb/hr	ER_{C2H4O}	0.00	0.00	0.00	0.00
Acrolein Concentration, ppmvd	C_{C3H4O}	0.00	0.00	0.00	0.00
Acrolein Concentration, ppmvw	C_{C3H4Ow}	0.00	0.00	0.00	0.00
Acrolein Emission Rate, lb/hr	ER_{C3H4O}	0.00	0.00	0.00	0.00
Formaldehyde Concentration, ppmvd	C_{CH2O}	11.72	11.52	11.49	11.58
Formaldehyde Concentration, ppmvw	C_{CH2Ow}	11.17	10.99	10.96	11.04
Formaldehyde Emission Rate, lb/hr	ER_{CH2O}	4.00	3.98	3.91	3.96
Methanol Concentration, ppmvd	C_{CH3OH}	20.25	19.74	19.87	19.95
Methanol Concentration, ppmvw	C_{CH3OHw}	19.30	18.83	18.96	19.03
Methanol Emission Rate, lb/hr	ER_{CH3OH}	7.36	7.27	7.21	7.28
Phenol Concentration, ppmvd	C_{C6H6O}	0.00	0.00	0.00	0.00
Phenol Concentration, ppmvw	C_{C6H6Ow}	0.00	0.00	0.00	0.00
Phenol Emission Rate, lb/hr	ER_{C6H6O}	0.00	0.00	0.00	0.00
Propionaldehyde Concentration, ppmvd	C_{C3H6O}	1.94	1.88	1.76	1.86
Propionaldehyde Concentration, ppmvw	C_{C3H6Ow}	1.85	1.79	1.68	1.77
Propionaldehyde Emission Rate, lb/hr	ER_{C3H6O}	1.28	1.25	1.16	1.23
Combined PCWP HAPs Emission Rate, lb/hr	ER_{HAPs}	12.64	12.51	12.28	12.48
Production Rate Throughput MSF/hr		57.04	56.62	56.62	56.76
Combined PCWP HAPs Emission Rate, lb/MSF		0.22	0.22	0.22	0.22

Method 1 Data

Location Arauco North America - Grayling, MI
Source Press Exhaust Stack
Project No. AST-2024-3437
Date 08/24/24

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	69.00	in
Nipple Length:	9.00	in
Depth of Duct:	60.00	in
Cross Sectional Area of Duct:	19.63	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	25.0	ft
Distance A Duct Diameters:	5.0	**(must be > 0.5)**
Distance B:	50.0	ft
Distance B Duct Diameters:	10.0	**(must be > 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	8	
Measurer (Initial and Date):	ADI	
Reviewer (Initial and Date):	LEW	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

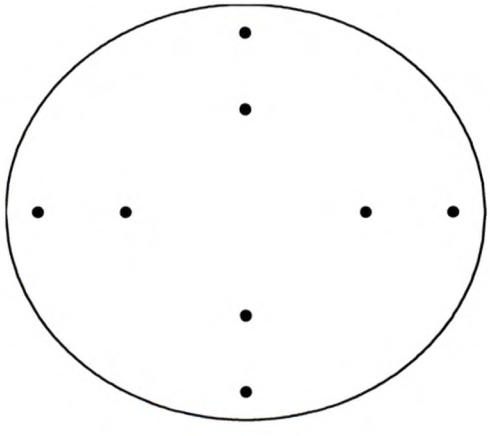
**Percent of stack diameter from inside wall to traverse point.*

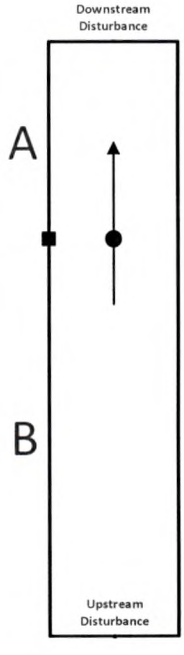
Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	6.7	4.02	13
2	25.0	15.00	24
3	75.0	45.00	54
4	93.3	55.98	65
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram

A = 25 ft.
B = 50 ft.
Depth of Duct = 60 in.

Cross Sectional Area





Cyclonic Flow Check

Location Arauco North America - Grayling, MI
Source Press Exhaust Stack
Project No. AST-2024-3437
Date 8/26/24

Sample Point	Angle (ΔP=0)
1	4
2	2
3	0
4	3
5	5
6	0
7	0
8	4
Average	2.3

Location Arauco North America - Grayling, MI
Source Press Exhaust Stack
Project No. AST-2024-3437

Run No.	1		2		3	
Date	8/28/24		8/28/24		8/28/24	
Status	VALID		VALID		VALID	
Start Time	9:30		10:00		11:30	
Stop Time	9:43		10:12		11:42	
Leak Check	Pass		Pass		Pass	
Traverse Point	Δ P (in. WC)	Ts (°F)	Δ P (in. WC)	Ts (°F)	Δ P (in. WC)	Ts (°F)
1	1.30	96	1.40	98	1.70	102
2	1.60	96	1.70	99	1.30	102
3	2.00	97	1.70	100	1.50	101
4	1.80	97	1.90	100	1.30	101
5	1.70	97	1.60	99	1.40	102
6	1.50	98	1.60	100	1.70	102
1	1.50	98	1.70	100	1.70	101
2	1.20	98	1.40	100	2.00	101
3	1.40	98	1.40	100	1.50	101
4	1.50	98	1.60	100	1.40	101
5	1.50	98	1.50	100	1.50	101
6	1.50	98	1.50	100	1.50	101

					Average
Square Root of ΔP, (in. WC)$^{1/2}$	$(\Delta P)^{1/2}$	1.239	1.257	1.239	1.245
Average ΔP, in. WC	(ΔP)	1.54	1.58	1.54	1.56
Pitot Tube Coefficient	(Cp)	0.820	0.820	0.820	0.820
Barometric Pressure, in. Hg	(Pb)	28.54	28.54	28.54	28.54
Static Pressure, in. WC	(Pg)	-0.70	-0.70	-0.70	-0.70
Stack Pressure, in. Hg	(Ps)	28.49	28.49	28.49	28.49
Average Temperature, °F	(Ts)	97.4	99.7	101.3	99.5
Average Temperature, °R	(Ts)	557.1	559.3	561.0	559.1
Measured Moisture Fraction	(BWSmsd)	0.047	0.046	0.046	0.047
Moisture Fraction @ Saturation	(BWSsat)	0.062	0.067	0.070	0.066
Moisture Fraction	(BWS)	0.047	0.046	0.046	0.047
Molecular Weight, lb/lb-mole (dry)	(Md)	29.00	29.00	29.00	29.00
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.48	28.49	28.49	28.49
Velocity, ft/sec	(Vs)	72.0	73.1	72.2	72.4
VFR at stack conditions, acfm	(Qa)	84,786	86,177	85,085	85,349
VFR at standard conditions, scfh	(Qsw)	4,587,970	4,644,498	4,572,009	4,601,492
VFR at standard conditions, scfm	(Qsw)	76,466	77,408	76,200	76,692
VFR at standard conditions, dscfm	(Qsd)	72,839	73,819	72,693	73,117

Dry Bulb/Wet Bulb Data

Location Arauco North America - Grayling, MI
Source Press Exhaust Stack
Project No. AST-2024-3437

Run Number	1	2	3
Time	9:30	10:00	11:30
Barometric Press, in. Hg (Pb)	28.54	28.54	28.54
Static Press, in. H_2O (Pstatic)	-0.70	-0.70	-0.70
Dry Bulb Temperature,°F (Td)	97	100	101
Wet Bulb Temperature,°F (Tw)	90	90	90
ΔT = Td-Tw, (ΔT)	7	10	11
Vapor Press H_2O at Tw (Vp)	1.422	1.422	1.422
Absolute stack static pressure, in. Hg (Ps)	28.489	28.489	28.489
Partial Press of H_2O (PP)	1.3514	1.3211	1.3110
Moisture, % (BWS)	4.74%	4.64%	4.60%