APEX

May 4, 2021

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Apex Project No. 11020-000020.00

Subject: **Air Emissions Test Report**
Arauco North America
SRN P0699
5851 Arauco Road
Grayling, Michigan
Permit to Install No. 59-16G

Dear Ms. Kajiya-Mills and Mr. Dickman:

On behalf of Arauco North America, Apex Companies, LLC submits this Report for compliance air emissions testing at the Arauco North America facility in Grayling, Michigan. The compliance testing was conducted from March 2 through 5, 2021.

If you have any questions, please contact us.

Sincerely,

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Tammi Van Til – Madison Consultant

APEX COMPANIES, LLC

Air Emissions Test Report
Arauco North America
Grayling, Michigan

arauco

PREPARED FOR:
Arauco North America
5851 Arauco Road
Grayling, Michigan
State Registration No. P0699

Apex Project No. 11020-000020.00

May 4, 2021

Apex Companies, LLC
46555 Humboldt Drive, Suite 103
Novi, Michigan 48377

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Executive Summary

Arauco North America (Arauco) retained Apex Companies, LLC (Apex) to conduct air emissions testing at the Arauco facility in Grayling, Michigan. The purpose of the air emission testing was to evaluate compliance with certain emission limits in Michigan Department of Environment, Great Lakes, and Energy (EGLE) Draft Permit to Install (PTI) No. 59-16G, dated March 23, 2021.

The emission units tested were:

- FGDRYERRTO – Dryer Regenerative Thermal Oxidizer RTO1 (RTO)
- EUFORMING – Forming Baghouses BH11 and BH13
- FGPRESSCOOL – Press and Cooler Wet Scrubber WS01 (Press)

The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 5, 7E, 10, 25A, 202, and 205.

Detailed results are presented in Tables 1 through 7 after the Tables Tab of this report. The following tables summarize the results of the testing conducted from March 2 through 5, 2021.

FGDRYERRTO Emissions Results

Parameter	Unit	Average Result	Permit Limit
CO	lb/hr	12.3	36.3
	lb/oven dried ton	0.22	0.43
NO_x	lb/hr	80.5	170
	lb/oven dried ton	1.4	2.0
VOC	lb/hr	5.4	7.1
PM	lb/hr	16.70	29.1
PM_{10}	lb/hr	16.70	28.4

CO: carbon monoxide
NO_x: nitrogen oxides
VOC: volatile organic compound
PM: particulate matter
lb/hr: pound per hour
lb/oven dried ton: pound per oven dried ton

EUFORMING Emissions Results

Parameter	Unit	Average Result	Permit Limit
EUFORMING (BH11 and BH13)			
VOC	lb/hr	6.12	9.34
BH11			
PM, PM_{10}, $PM_{2.5}$	gr/dscf	0.0025	0.002
	lb/hr	1.09	1.05
BH13			
PM, PM_{10}, $PM_{2.5}$	gr/dscf	0.0018	0.002
	lb/hr	0.49	0.66

VOC: volatile organic compound
PM: particulate matter
gr/dscf: grain per dry standard cubic foot
lb/hr: pound per hour

FGPRESSCOOL Emissions Results

Parameter	Unit	Average Result	Permit Limit
CO	lb/hr	1.19	2.85
	lb/MSF ¾"	0.019	0.042
NO_x	lb/hr	1.1	2.5
	lb/MSF ¾"	0.017	0.04
VOC	lb/hr	22.9	49.5
	lb/MSF ¾"	0.362	0.728
PM, PM_{10}, $PM_{2.5}$	lb/hr	3.67	4.74

CO: carbon monoxide
NO_x: nitrogen oxides
VOC: volatile organic compound
PM: particulate matter
lb/hr: pound per hour
lb/MSF ¾": pound per thousand square foot of board produced on a ¾ inch basis

1.0 Introduction

1.1 Summary of Test Program

Arauco North America (Arauco) retained Apex Companies, LLC (Apex) to conduct air emissions testing at the Arauco facility in Grayling, Michigan. The purpose of the air emission testing was to evaluate compliance with certain emission limits in Michigan Department of Environment, Great Lakes, and Energy (EGLE) Draft Permit to Install (PTI) No. 59-16G, dated March 23, 2021.

The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 5, 7E, 10, 25A, 202, and 205.

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)
FGDRYERRTO	Carbon monoxide (CO), Nitrogen oxides (NO_x), Volatile organic compound (VOC), Particulate matter (PM), less than 10 microns (PM_{10})	March 2, 2021
EUFORMING Baghouse BH11	VOC PM, PM_{10}, PM less than 2.5 microns ($PM_{2.5}$)	March 3, 2021
EUFORMING Baghouse BH13	VOC PM, PM_{10}, $PM_{2.5}$	March 4, 2021
FGPRESSCOOL	CO, NO_x, VOC, PM, PM_{10}, $PM_{2.5}$	March 5, 2021

1.2 Key Personnel

The key personnel involved in this test program are listed in Table 1-2. Mr. David Kawasaki, with Apex, led the emission testing program. Mr. James Osga, with Arauco, provided process coordination and recorded operating parameters. Mr. Jeremy Howe, with EGLE, witnessed the testing and verified production parameters were recorded.

Table 1-2
Key Contact Information

<table>
<tr><th>Arauco</th><th>Apex</th></tr>
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</table>

2.0 Source and Sampling Locations

2.1 Process Description

Arauco operates a medium-density particleboard plant located at 5851 Arauco Road in Grayling, Michigan. The facility includes a woodyard and conducts wood furnish preparation, drying, forming, pressing, cooling, finishing, and other related operations. Refer to Figure 2-1 for a diagram showing the manufacturing process.

Operating parameters were measured and recorded by Arauco personnel during testing. Tables 2-1 and 2-2 summarize the operating conditions during testing. Additional operating parameter data are included in Appendix F.

Table 2-1
Dryer Feed Rate
March 2, 2021

Run	Dryer Feed Rate (dried ton/hour)
1	49.05
2	61.02
3	58.45
Average	**56.17**

Table 2-2
Board Production Rate
March 5, 2021

Run	Particleboard Production Rate (MSF ¾")
1	63.56
2	62.10
3	64.07
Average	**63.24**

MSF ¾": 1,000 square feet per hour, on a ¾ inch board thickness basis

MDP Process Block Diagram
December 10, 2017

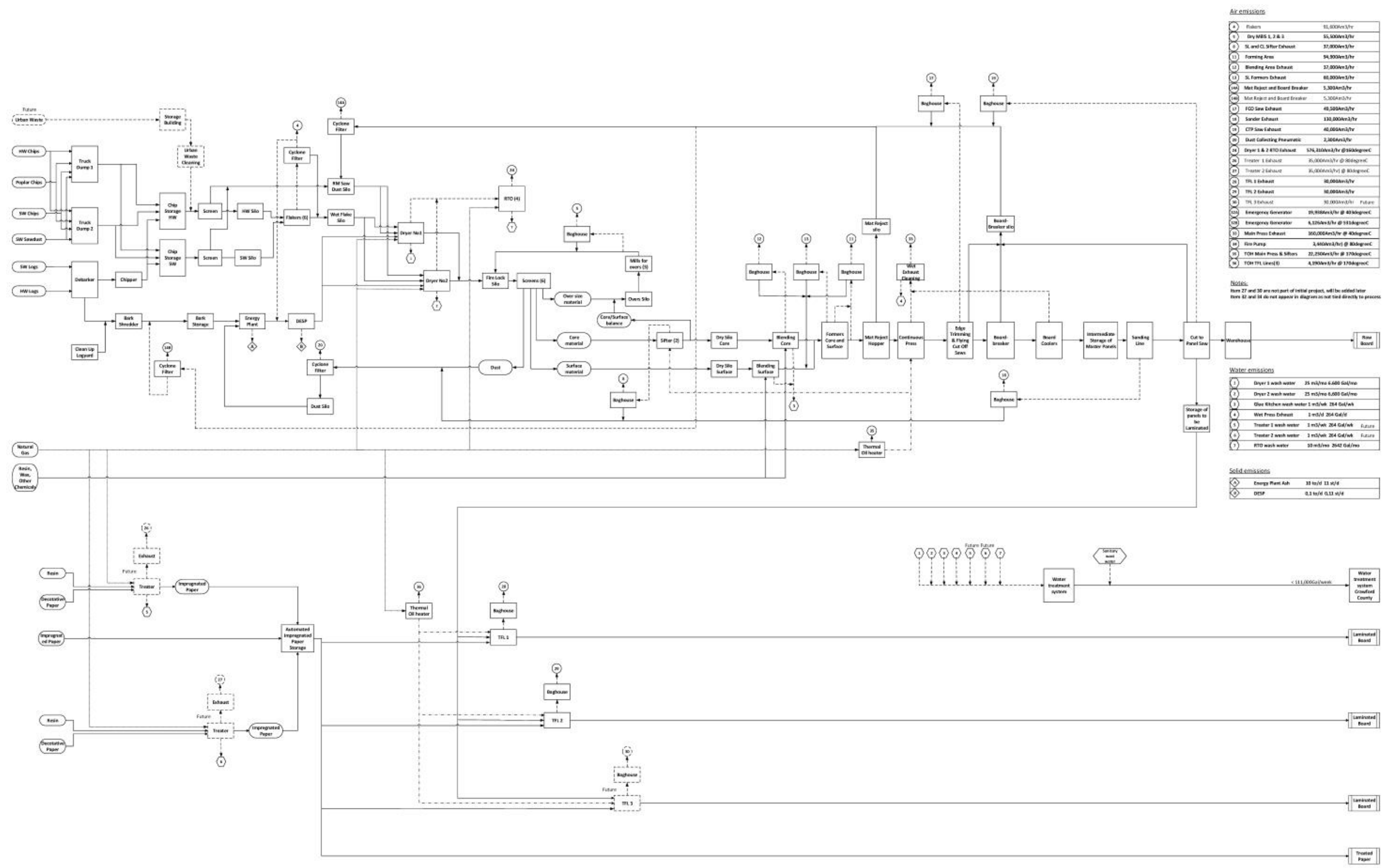


Figure 2-1. Process Block Diagram

2.2 Control Equipment Description

2.2.1 FGDRYERRTO – RTO1

Gaseous emissions from the process equipment are normally exhausted through Dryer RTO1.

There are two identical rotary dryers that receive green wood flakes from the flakers. The heat for these dryers is provided by the thermal energy plant as well as natural gas burners located on each dryer. The thermal energy plant combusts wood derived fuel, including bark, sawdust and other wood waste from the process. The exhaust from the energy plant is controlled by a dry electrostatic precipitator prior to entering the dryers. The flakes are separated from the dryer exhaust by classifiers (cyclones) and the dryer exhaust is then treated by the RTO before exiting the stack (identified in the PTI as SV-24).

The RTO consists of three identical, but separately controlled, combustion chambers. A fourth combustion chamber is under construction, so that the facility will have the capability of having a chamber on standby in case of a malfunction or bake-out requirements in another RTO chamber. The RTO is fired with natural gas, with a total heat input of 25 million British thermal units (MMBtu/hr) for the four combustion chambers. The RTO was operated at or above the combustion chamber temperature established in the most recent MACT testing.

Operating parameters were measured and recorded by Arauco personnel during testing. Table 2-3 summarizes the operating conditions during testing of the RTO. Additional operating parameter data are included in Appendix F.

Table 2-3
RTO Operating Data
March 2, 2021

Run	Operating Temperature (°F)	Natural Gas Usage (ft^3/hr)
1	1,576	70,810
2	1,576	103,191
3	1,576	86,449
Average	**1,576**	**86,817**

2.2.2 EUFORMING – BH11 and BH13

The dried flakes from the dryers are sized and fed into the blending and forming operation prior to pressing. There are two mechanical blenders that mix the flakes with a measured amount of resins, catalysts, and wax emulsions in a precisely measured blend. Urea-formaldehyde (UF) resin is used in the production of particleboard. One blender is for the larger core material and one blender is for the smaller surface material.

From the surface blender, the flakes are sent on conveyors to the surface formers. From the core blender, the material is sent on conveyors to the core formers. The formers create layers with the core material being 'sandwiched' between surface layers in the proper amounts according to the product being pressed. The exhaust from the formers are controlled by Baghouse BH11 and Baghouse BH13 and exhausted through SV-11 and SV-13.

Operating parameters were measured and recorded by Arauco personnel during testing. Tables 2-4 and 2-5 summarize the operating conditions during testing of BH11 and BH13. Additional operating parameter data are included in Appendix F.

Table 2-4
BH11 Operating Data
March 3, 2021

Run	Pressure Drop (mbar)
1	5.00-5.10
2	4.86-4.91
3	4.90-5.05
Average	**4.92-5.02**

Table 2-5
BH13 Operating Data
March 4, 2021

Run	Pressure Drop (mbar)
1	1.70-1.78
2	1.69-1.79
3	1.67-1.79
Average	**1.69-1.79**

2.2.3 FGPRESSCOOL – WS01

The continuous press and board cooling system is equipped with a press and cooler wet scrubber (WS01) to control particulate emissions.

The mat from the formers is conveyed into a continuous press which applies pressure and heat to cure the resin and form the board. The board exits the press and then is conveyed to the cooler. The boards are loaded into the cooler prior to being sent to the warehouse for finishing and stacking. The press and cooler are contained in a single enclosure meeting the definition of a wood products enclosure in 40 CFR Part 63, Subpart DDDD. Exhaust from the press extraction system discharges into a common duct that combines with the general exhaust duct over the cooler area. Water sprays are utilized in this area, which feed into an air-water separator before the air discharges from the stack (SV-33).

Operating parameters were measured and recorded by Arauco personnel during testing. Table 2-6 summarizes the operating conditions during testing of the Press. Additional operating parameter data are included in Appendix F.

Table 2-6
Press Operating Data
March 5, 2021

Run	Water Flow Rate (gallon/min)
1	793-796
2	812-819
3	813-813
Average	**806-809**

2.3 Flue Gas Sampling Locations

2.3.1 FGDRYERRTO Sampling Location

Four sampling ports oriented at 90° to one another are located in a straight section of a 123 inch-internal-diameter duct. The sampling ports are located:

- Approximately 39 feet (3.8 duct diameters) from the nearest downstream disturbance.
- Approximately 33 feet (3.2 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via stairs. A photograph of the RTO sampling location is presented in Figure 2-2. Figure 1 in the Appendix depicts the RTO sampling ports and traverse point locations.

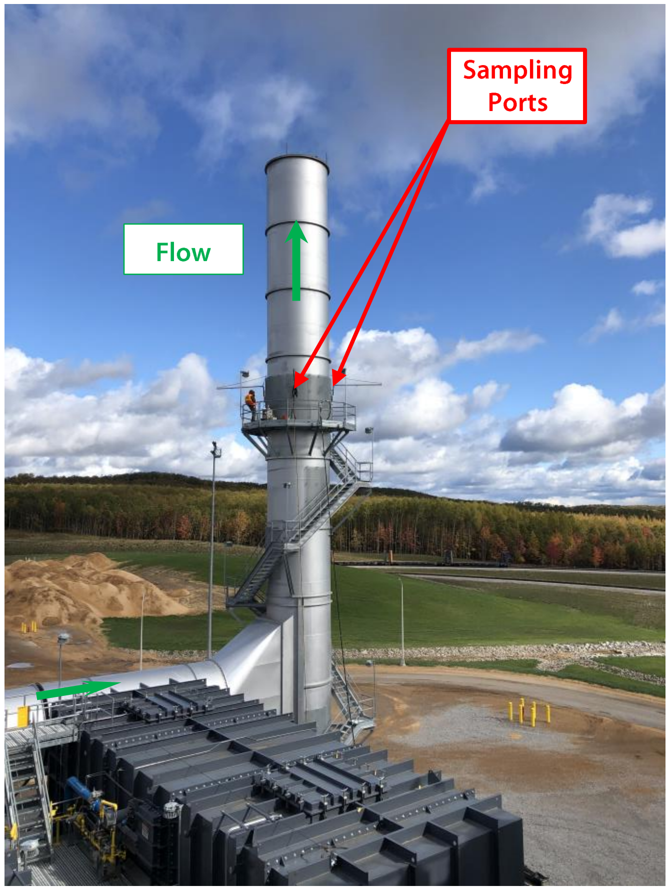


Figure 2-2. FGDRYERRTO Outlet Sampling Location

2.3.2 EUFORMING BH11 Sampling Location

Three sampling ports oriented at 90° to one another are located in a straight section of a 49.25 inch-internal-diameter duct. The sampling ports are located:

- Approximately 16 feet (3.9 duct diameters) from the nearest downstream disturbance.
- Approximately 50 feet (12.2 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via aerial lift. A photograph of the EUFORMING BH11 sampling location is presented in Figure 2-3. Figure 2 in the Appendix depicts the EUFORMING BH11 sampling ports and traverse point locations.

2.3.3 EUFORMING BH13 Sampling Location

Three sampling ports oriented at 90° to one another are located in a straight section of a 39.25 inch-internal-diameter duct. The sampling ports are located:

- Approximately 16 feet (4.9 duct diameters) from the nearest downstream disturbance.
- Approximately 50 feet (15.3 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via ladder. A photograph of the EUFORMING BH13 sampling location is presented in Figure 2-3. Figure 3 in the Appendix depicts the EUFORMING BH13 sampling ports and traverse point locations.

Figure 2-3. EUFORMING BH11 and BH13 Outlet Sampling Locations

2.3.4 FGPRESSCOOL Sampling Location

Three sampling ports oriented at 90° to one another are located in a straight section of a 60 inch-internal-diameter duct. The sampling ports are located:

- Approximately 25 feet (5.0 duct diameters) from the nearest downstream disturbance.
- Approximately 50 feet (10.0 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via ladder. A photograph of the FGPRESSCOOL sampling location is presented in Figure 2-4. Figure 4 in the Appendix depicts the FGPRESSCOOL sampling ports and traverse point locations.

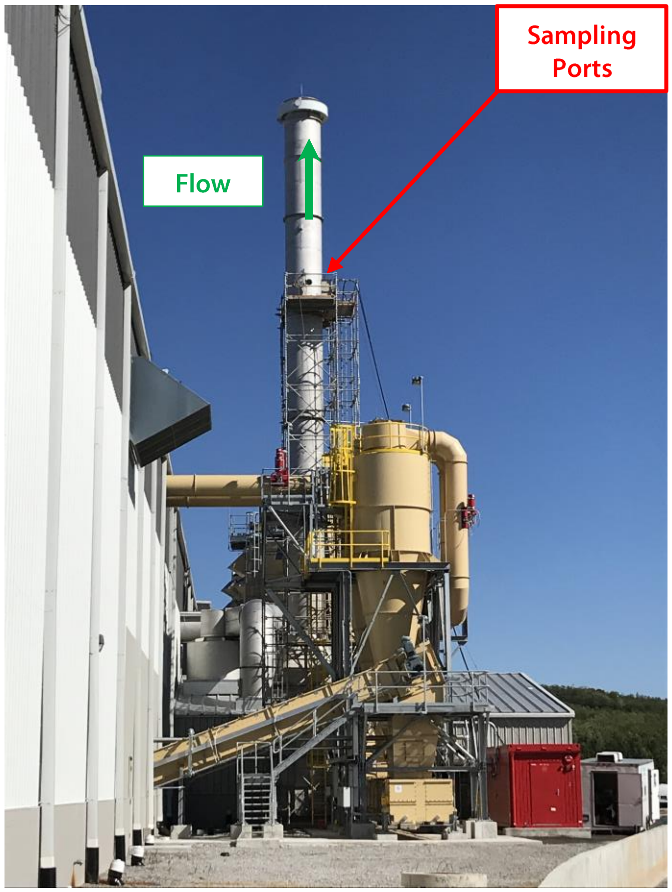


Figure 2-4. FGPRESSCOOL Outlet Sampling Location

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).

3.0 Summary and Discussion of Results

3.1 Objectives and Test Matrix

The objective of the air emission testing was to evaluate compliance with certain emission limits in EGLE Draft PTI No. 59-16G, dated March 23, 2021.

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 (2021)	Run	Start Time	End Time	Analytical Laboratory
FGDRYERRTO	Flowrate, molecular weight, moisture content, PM, NO_x, CO, VOC	USEPA 1-4, 5/202, 7E, 10, 25A, 205	March 2	1	8:40	9:40	Bureau Veritas Laboratories
				2	10:00	11:00	
				3	11:14	12:14	
EUFORMING BH11	Flowrate, molecular weight, moisture content, PM, VOC	USEPA 1-4, 5/202, 25A, 205	March 3	1	7:22	8:22	Bureau Veritas Laboratories
				2	8:43	9:43	
				3	10:00	11:00	
EUFORMING BH13	Flowrate, molecular weight, moisture content, PM, VOC	USEPA 1-4, 5/202, 25A, 205	March 4	1	7:59	8:59	Bureau Veritas Laboratories
				2	9:31	10:31	
				3	10:50	11:50	
FGPRESSCOOL	Flowrate, molecular weight, moisture content, PM, NO_x, CO, VOC	USEPA 1-4, 5/202, 7E, 10, 25A, 205	March 5	1	8:47	9:47	Bureau Veritas Laboratories
				2	11:52	12:52	
				3	13:15	14:15	

3.2 Field Test Changes and Issues

Communication between Arauco, Apex, and EGLE allowed the testing to be completed as proposed in the March 30, 2020, Intent-to-Test Plan, with the following exceptions:

- Formaldehyde and acetaldehyde testing were not conducted. Testing was delayed to a later date due to permit modification requests.
- $PM_{2.5}$ testing for the FGDRYERRTO source was not conducted during this testing event, but will be conducted at a future date.

3.3 Summary of Results

The results of testing are presented in Tables 3-2 through 3-4. Detailed results are presented in the Appendix Tables 1 through 7 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
FGDRYERRTO Emissions Results

Parameter	Unit	Run 1	Run 2	Run 3	Average Result	Permit Limit
CO	lb/hr	9.2	15.2	12.6	**12.3**	**36.3**
	lb/oven dried ton	0.19	0.25	0.22	**0.22**	**0.43**
NO_x	lb/hr	71.0	87.1	83.4	**80.5**	**170**
	lb/oven dried ton	1.4	1.4	1.4	**1.4**	**2.0**
VOC	lb/hr	6.7	5.3	4.2	**5.4**	**7.1**
PM	lb/hr	17.28	18.75	14.08	**16.70**	**29.1**
PM_{10}	lb/hr	17.28	18.75	14.08	**16.70**	**28.4**

CO: carbon monoxide
NO_x: nitrogen oxides
VOC: volatile organic compound
PM: particulate matter
lb/hr: pound per hour
lb/oven dried ton: pound per oven dried ton

Table 3-3
EUFORMING Emissions Results

Parameter	Unit	Run 1	Run 2	Run 3	Average Result	Permit Limit
EUFORMING (BH11 and BH13)						
VOC	lb/hr	5.79	6.18	6.39	**6.12**	**9.34**
BH11						
PM, PM_{10}, $PM_{2.5}$	gr/dscf	0.0032	0.0019	0.0024	**0.0025**	**0.002**
	lb/hr	1.41	0.82	1.03	**1.09**	**1.05**
BH13						
PM, PM_{10}, $PM_{2.5}$	gr/dscf	0.0030	0.0013	0.0011	**0.0018**	**0.002**
	lb/hr	0.83	0.36	0.28	**0.49**	**0.66**

VOC: volatile organic compound
PM: particulate matter
gr/dscf: grain per dry standard cubic foot
lb/hr: pound per hour

Table 3-4
FGPRESSCOOL Emissions Results

Parameter	Unit	Run 1	Run 2	Run 3	Average Result	Permit Limit
CO	lb/hr	1.44	1.10	1.04	**1.19**	**2.85**
	lb/MSF ¾"	0.023	0.018	0.016	**0.019**	**0.042**
NO_x	lb/hr	1.3	0.9	1.0	**1.1**	**2.5**
	lb/MSF ¾"	0.021	0.014	0.016	**0.017**	**0.04**
VOC	lb/hr	26.2	19.9	22.6	**22.9**	**49.5**
	lb/MSF ¾"	0.412	0.321	0.353	**0.362**	**0.728**
PM, PM_{10}, $PM_{2.5}$	lb/hr	2.84	3.22	4.96	**3.67**	**4.74**

CO: carbon monoxide
NO_x: nitrogen oxides
VOC: volatile organic compound
PM: particulate matter
lb/hr: pound per hour
lb/MSF ¾": pound per thousand square foot of board produced on a ¾ inch basis

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	RTO	BH11	BH13	Press	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
Filterable particulate matter (FPM)	●	●	●	●	5	Determination of Particulate Matter Emissions from Stationary Sources
Nitrogen oxides (NO_x)	●			●	7E	Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrument Analyzer Procedure)
Carbon monoxide (CO)	●			●	10	Determination of Carbon Monoxide Emissions from Stationary Sources (Instrument Analyzer Procedure)
Volatile organic compounds (VOCs)	●	●	●	●	25A	Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer
Condensable particulate matter (CPM)	●	●	●	●	202	Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources
Gas dilution	●	●	●	●	205	Verification of Gas Dilution Systems for Field Instrument Calibrations

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 and the measurement of velocity profiles. Figures 1 through 4 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 evaluated whether cyclonic flow was present at the sampling locations. 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 average of the measured traverse point flue gas velocity null angles 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. Prior to testing, the moisture content was estimated using measurements from previous testing, psychrometric charts and/or water saturation vapor pressure tables. These data were used in conjunction with preliminary velocity head pressure and temperature data to calculate flue gas velocity, nozzle size, and to establish the isokinetic sampling rate for the Methods 5 and 202 sampling. For each sampling run, moisture content of the flue gases was measured using the reference method outlined in Section 2 of USEPA Method 4 in conjunction with the performance of USEPA Methods 5 and 202.

4.1.4 Particulate Matter (USEPA Methods 5 and 202)

USEPA Methods 5, "Determination of Particulate Emissions from Stationary Sources," and 202, "Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources," were used to measure particulate matter emissions. Figure 4-1 depicts the USEPA Methods 5 and 202 sampling train.

The Method 5 sampling train collects filterable particulate matter (FPM). The Method 202 sampling train collects condensable particulate matter (CPM), which is defined as material that is in vapor phase at stack conditions, but that which condenses and/or reacts upon cooling and dilution in the ambient air to form solid or liquid PM immediately after discharge from the stack. Method 202 collects the CPM using a water-dropout impinger, modified Greenburg-Smith impinger, and a Teflon filter.

Apex's modular isokinetic stack sampling system consists of the following:

- A stainless steel or glass button-hook nozzle.
- A heated (248±25°F) stainless steel or glass-lined probe.
- A desiccated and pre-weighed 83-millimeter-diameter glass fiber filter (manufactured to at least 99.95% efficiency (<0.05 % penetration) for 0.3-micron dioctyl phthalate smoke particles) in a heated (248±25°F) filter box.
- A Method 23-type stack gas condenser.
- A set of four pre-cleaned impingers with the configuration shown in Table 4-2.
- A second (back-half) CPM filter holder inserted between the second and third impingers and maintained at a temperature less than 85°F.
- A sampling line.
- An Environmental Supply® control case equipped with a pump, dry-gas meter, and calibrated orifice.

Table 4-2
USEPA Methods 5 and 202 Impinger Configuration

Impinger Order (Upstream to Downstream)	Impinger Type	Impinger Contents	Contents
1	Modified - knockout	Empty	0 grams
2	Modified	Empty	0 grams
CPM filter			
3	Modified	HPLC Water	~100 grams
4	Modified	Silica desiccant	~300 grams

Prior to testing, a preliminary velocity traverse was performed and a nozzle size was calculated that would allow isokinetic sampling at an average rate of approximately 0.75 cubic feet per minute (cfm). Apex selected a pre-cleaned nozzle that has an inner diameter that approximated the calculated ideal value. The nozzle was inspected and measured with calipers across three cross-sectional chords to evaluate the inside diameter; rinsed and brushed with acetone; and connected to the sample probe.

The impact and static pressure openings of the Pitot tube were leak-checked at or above a velocity head of 3.0 inches of water for more than 15 seconds. The sampling train was leak-checked by capping the nozzle tip and applying a vacuum of approximately 10 inches of mercury to the sampling train. The dry-gas meter was then monitored (for approximately 1 minute) to measure that the sample train leak rate was less than 0.02 cubic feet per minute (cfm). The probe and filter heaters were turned on, and the sample probe was inserted into the sampling port to begin sampling.

Ice was placed around the impingers, and the probe and filter temperatures were allowed to stabilize at 248±25 °F before each sample run. After the desired operating conditions were coordinated with the facility, testing was initiated.

Stack parameters (e.g., flue velocity, temperature) were monitored to establish the isokinetic sampling rate within 100±10 % for the duration of the test. Data was recorded at each of the traverse points.

At the conclusion of a test run and the post-test leak check, the sampling train was disassembled, and the impingers and filter were transported to the recovery area. The filter was recovered using tweezers and placed in a Petri dish. The Petri dish was immediately labeled and sealed with Teflon tape. The nozzle, probe, and the front half of the filter holder assembly were brushed and, at a minimum, triple-rinsed with acetone to recover particulate matter. The acetone rinses were collected in pre-cleaned sample containers.

At the end of a test run, the mass of liquid collected in each impinger was measured using a scale to within ±0.5 grams; these masses were used to calculate moisture content of the flue gas. The impinger train was then purged with nitrogen, at a minimum flow rate of 14 liters per minute, for a minimum of one hour. The purpose of the nitrogen purge was to remove any dissolved sulfur dioxide gases from the impinger.

The contents of the first two impingers were collected in a glass sample container labeled as CPM Container 1. The back of the filter-holder, condenser, Impingers 1 and 2, front-half of the CPM filter holder, and all connecting glassware were rinsed twice with HPLC water and the recovery rinsate was added to CPM Container 1.

Following the HPLC water rinse, the back of the filter-holder, condenser, Impingers 1 and 2, front-half of the CPM filter holder, and all connecting glassware were rinsed with acetone and then rinsed twice with hexane. The acetone and hexane rinses were collected in a glass sample container labeled as CPM Container 2.

The CPM filter was recovered using Teflon-lined tweezers and placed in a Petri dish; the dish was sealed with Teflon tape, and labeled as CPM Container 3. The mass of condensate collected in Impingers 3 and 4 were measured to calculate the moisture content of the flue gas; these impingers were not recovered.

Apex labeled each container with the test number, test location, and test date, and marked the level of liquid on the outside of the container. Immediately after recovery, the sample containers were stored. The sample containers were transported to Bureau Veritas Laboratories in Mississauga, Ontario, Canada for analysis. The laboratory analytical results are included in Appendix E.

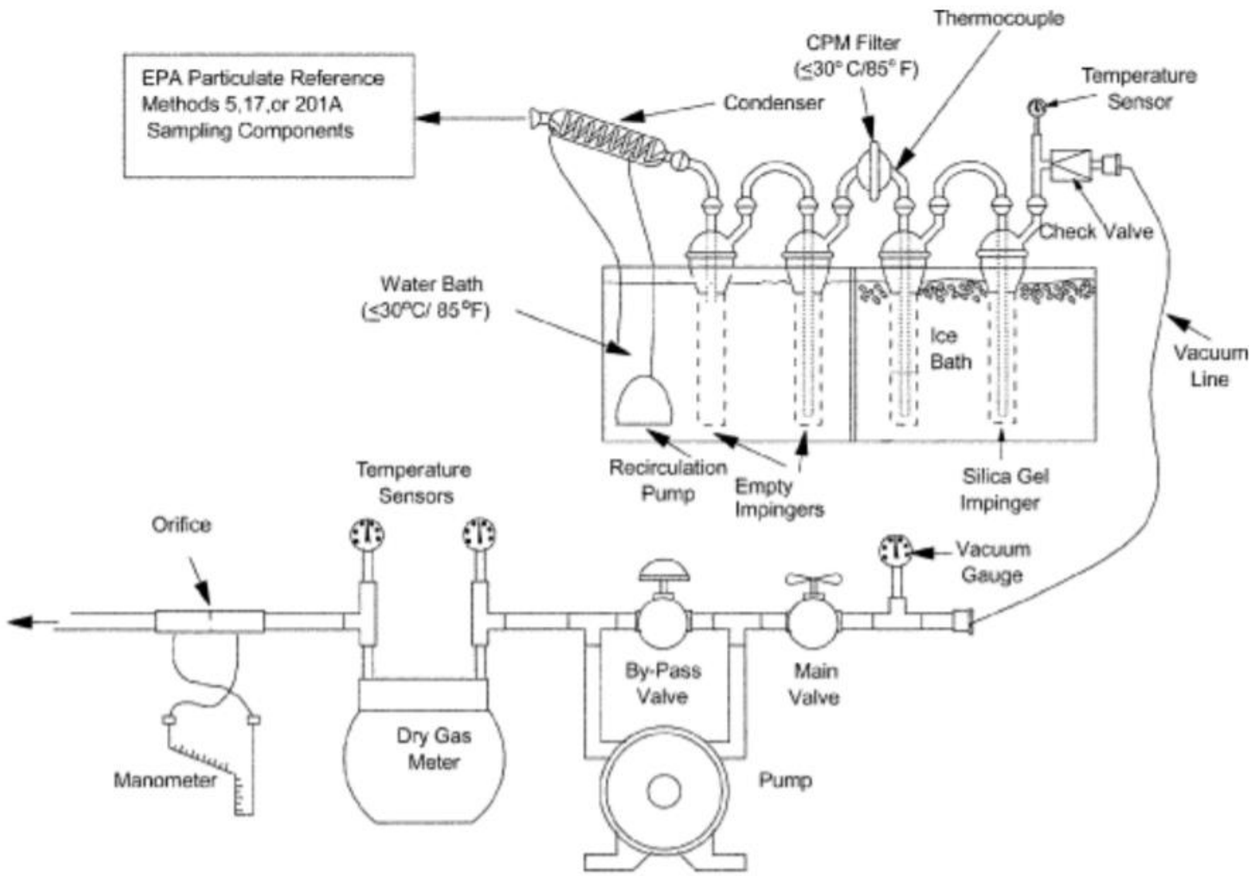


Figure 4-1. USEPA Methods 5 and 202 Sampling Train

4.1.5 Nitrogen Oxides and Carbon Monoxide (USEPA Methods 7E and 10)

USEPA Method 7E, "Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)," was used to measure nitrogen oxides (NO_x) concentrations in the flue gas. USEPA Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)," was used to measure carbon monoxide (CO) concentrations in the flue gas. Flue gas was continuously sampled in the stack and conveyed to an analyzer for 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.
- NO_x and CO analyzers.

Figure 4-2 depicts the USEPA Methods 7E and 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.

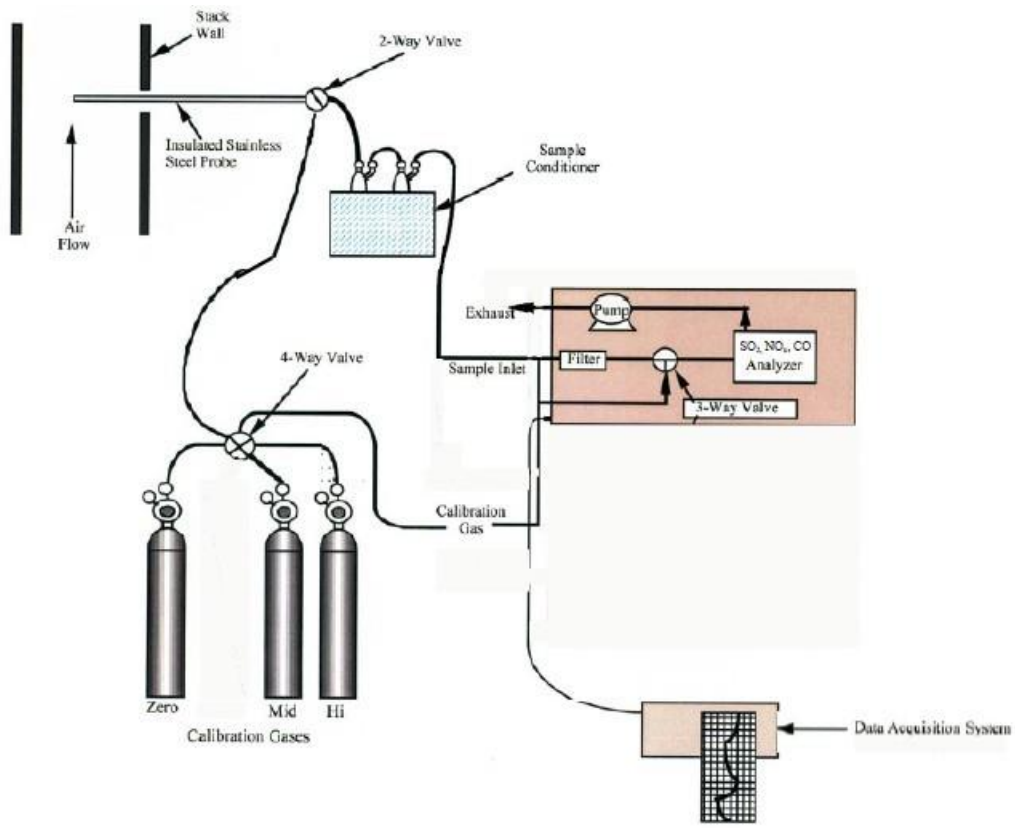


Figure 4-2. USEPA Methods 7E and 10 Sampling Train

Prior to testing, a 3-point stratification test was conducted at 17, 50, and 83% of the stack diameter for at least twice the response time to determine 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.

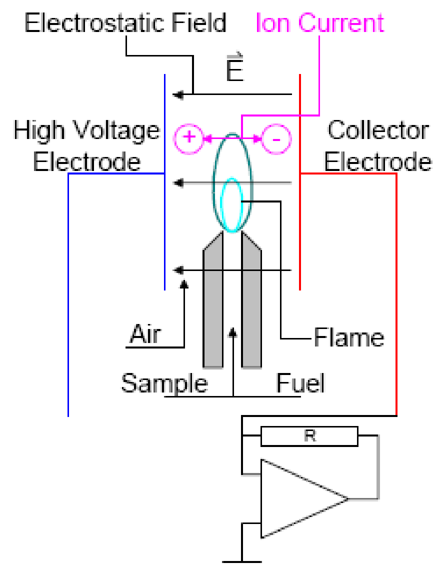
The analyzer drift data was used to correct the measured flue gas concentrations. Recorded concentrations were averaged over the duration of each test run.

NO/NO2 Conversion Check. An NO/NO_2 conversion check was performed prior to testing by introducing an NO_2 calibration gas into the NO_X analyzer. The analyzer's NO_X concentration response was greater than 90% of the introduced NO_2 calibration gas concentration and met the converter efficiency requirement of Section 13.5 of USEPA Method 7E.

4.1.6 Volatile Organic Compounds (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 flame ionization detector (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 positive 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. The span value was set to 1.5 to 2.5 times the expected concentration (e.g., 0-100 ppmv). 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.

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.

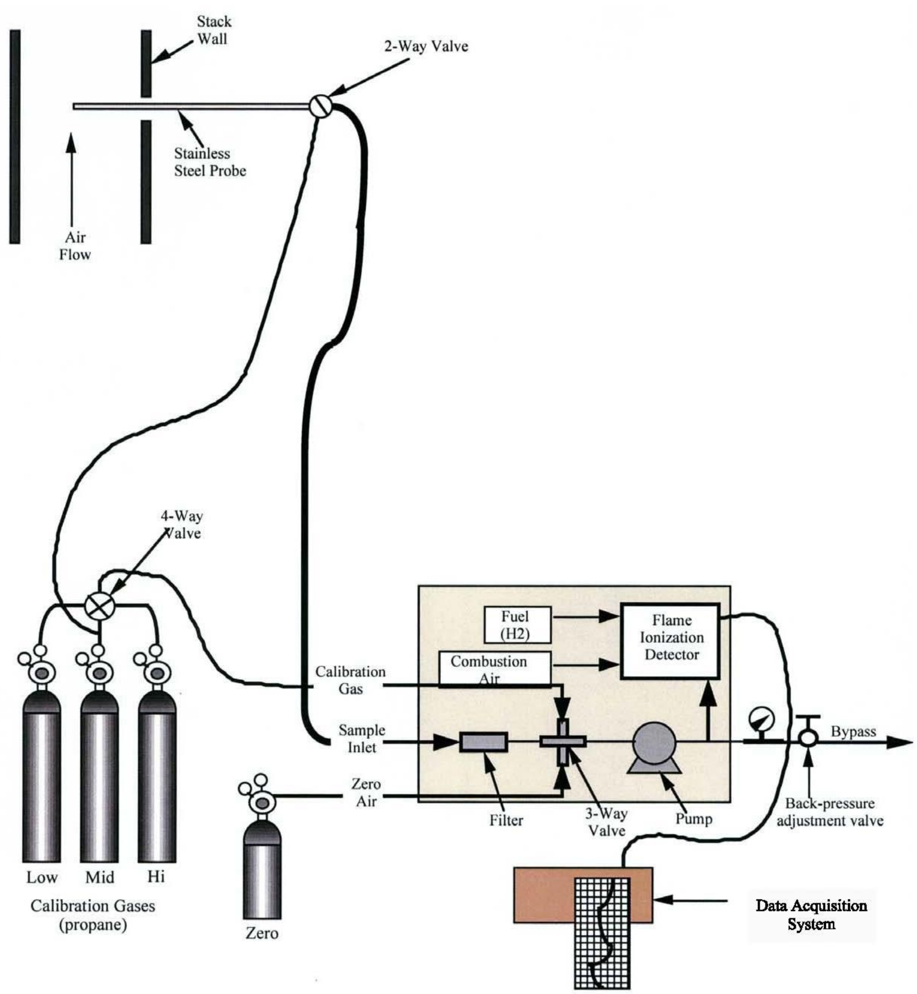


Figure 4-3. USEPA Method 25A Sampling Train

4.1.7 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

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

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 Audit Sample Results QA/QC

QA audit samples were not proposed during this test program. Currently, audit samples for the parameters to be measured are not available from the USEPA Stationary Source Audit Program.

5.2.2 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 Methods 5 and 202 Sampling Train QA/QC

Parameter	Run 1	Run 2	Run 3	Method Requirement	Comment
FGDRYERRTO					
Average velocity pressure head (in H_2O)	0.73	0.82	0.78	>0.05 in H_2O	Valid
Sampling train post-test leak check	0 ft^3 for 1 min at 6 in Hg	0 ft^3 for 1 min at 5 in Hg	0 ft^3 for 1 min at 7 in Hg	<0.020 ft^3 for 1 minute at a vacuum ≥ recorded during test	Valid
Sampling vacuum (in Hg)	3 to 5	3 to 4	5		
EUFORMING BH11					
Average velocity pressure head (in H_2O)	1.4	1.3	1.3	>0.05 in H_2O	Valid
Sampling train post-test leak check	0 ft^3 for 1 min at 6 in Hg	0 ft^3 for 1 min at 7 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)	3 to 5	4	4		
EUFORMING BH13					
Average velocity pressure head (in H_2O)	1.4	1.4	1.3	>0.05 in H_2O	Valid
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	<0.020 ft^3 for 1 minute at a vacuum ≥ recorded during test	Valid
Sampling vacuum (in Hg)	3	3	3 to 4		
FGPRESSCOOL					
Average velocity pressure head (in H_2O)	1.2	1.2	1.2	>0.05 in H_2O	Valid
Sampling train post-test leak check	0 ft^3 for 1 min at 6 in Hg	0 ft^3 for 1 min at 7 in Hg	0 ft^3 for 1 min at 6 in Hg	<0.020 ft^3 for 1 minute at a vacuum ≥ recorded during test	Valid
Sampling vacuum (in Hg)	4	4 to 6	4		

5.2.3 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	CC104648	99.9995%	9/10/28
Nitrogen oxides	Airgas	CC98592	500.4 ppm	8/18/25
Nitrogen oxides	Airgas	XC034375B	100.6 ppm	8/17/25
Nitrogen dioxide	Airgas	CC323209	50.99 ppm	N/A
Carbon monoxide	Airgas	CC96621	475.4 ppm	10/1/21
Carbon monoxide	Airgas	XC034476B	126.8 ppm	10/29/22
Hydrogen	Airgas	CC2495	99.999%	N/A
Air	Airgas	CC469317	--	7/17/27
Propane	Airgas	CC105259	84.66 ppm	8/19/25

5.2.4 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
2	0.994 (2/25/2021)	1.002 (3/25/2021)	0.008	±0.05	Valid

5.2.5 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.

5.2.6 Laboratory Blanks QA/QC

QA/QC blanks were analyzed for the parameters of interest. The results are presented in Table 5-4. Blank corrections were applied to the sample results following USEPA Methods 5 and 202 procedures. Blank and sample laboratory results are included in Appendix E.

Table 5-4
Laboratory Blanks QA/QC

Sample Identification	Result (mg)	Comment
Method 5 Filter Blank	<0.30	Reporting limit is 0.30 milligrams.
Method 5 Acetone Blank	0.7	Reporting limit is 0.5 milligrams. Sample volume was approximately 130 milliliters.
Method 202 Reagent Blank - Water	0.7	Reporting limit is 0.5 milligrams. Sample weight was approximately 140 grams.
Method 202 Reagent Blank - Acetone	0.7	Reporting limit is 0.5 milligrams. Sample volume was approximately 130 milliliters.
Method 202 Reagent Blank - Hexane	3.7	Reporting limit is 1.0 milligrams. Sample weight was approximately 91 grams.
Method 202 Proof Blank - Inorganic	1.2	Reporting limit is 0.5 milligrams. Sample weight was approximately 130 grams.
Method 202 Proof Blank - Organic	2.7	Reporting limit is 1.0 milligrams. Sample weight was approximately 120 grams.

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 Sample Identification and Custody

The Apex project manager was responsible for the handling and procurement of the data collected in the field. The project manager ensured the data sheets are accounted for and completed in their entirety. Applicable Chain of Custody procedures followed guidelines outlined within ASTM D4840-99 (Reapproved 2010), "Standard Guide for Sample Chain-of-Custody Procedures." Detailed sampling and recovery procedures are described in Section 4.1. For each sample collected (i.e., impinger), sample identification and custody procedures were completed as follows:

- Containers were sealed to prevent contamination.
- Containers were labeled with test number, location, and test date.
- The level of fluid was marked on the outside of the sample containers to indicate if leakage occurred prior to receipt of the samples by the laboratory.
- Containers were placed in a cooler for storage, if necessary.
- Samples were logged using guidelines outlined in ASTM D4840-99 (Reapproved 2010).
- Samples were transported to the laboratory under chain of custody.

Chains of custody and laboratory analytical results are included in Appendix E.

5.5 QA/QC Problems

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

6.0 Limitations

The information and opinions rendered in this report are exclusively for use by Arauco North America. Apex Companies, LLC will not distribute or publish this report without consent of Arauco North America except as required by law or court order. The information and opinions are given in response to a limited assignment and should be implemented only in light of that assignment. Apex Companies, LLC accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

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Tables

Table 1

RTO Gaseous Results

Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 2, 2021

Parameter	Run 1	Run 2	Run 3	Average
Run Time	8:40-9:40	10:00-11:00	11:14-12:14	
Dryer Feed Rate (dried ton/hr)	49.05	61.02	58.45	**56.17**
Exhaust Gas Stream Volumetric Flowrate (scfm)	196,432	194,575	208,699	**199,902**
Exhaust Gas Stream Volumetric Flowrate (dscfm)	156,414	156,171	156,018	**156,201**
NOx Concentration (ppmvd)	62.6	75.9	73.0	**70.5**
Corrected NO_x Concentration (C_{gas})†	63.3	77.8	74.5	**71.9**
NOx Mass Emission Rate (lb/hr)	71.0	87.1	83.4	**80.5**
NOx Mass Emission Rate (lb/oven dried ton)	1.4	1.4	1.4	**1.4**
CO Concentration (ppmvd)	14.7	24.2	18.3	**19.1**
Corrected CO Concentration (C_{gas})†	13.4	22.3	18.6	**18.1**
CO Mass Emission Rate (lb/hr)	9.2	15.2	12.6	**12.3**
CO Mass Emission Rate (lb/oven dried ton)	0.19	0.25	0.22	**0.22**
VOC Concentration (ppmvw)	5.0	4.2	3.2	**4.1**
Corrected VOC Concentration (C_{gas})†	5.0	4.0	2.9	**3.9**
VOC Mass Emission Rate (lb/hr)	6.7	5.3	4.2	**5.4**

ppmvw: part per million by volume, wet basis
ppmvd: part per million by volume, dry basis
lb/hr: pound per hour
scfm: wet standard cubic feet per minute
dscfm: dry standard cubic feet per minute

Table 2
RTO Particulate Matter Results
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 2, 2021

Meter/Nozzle Information		Run 1	Run 2	Run 3	Average
Meter Temperature, T_m	ºF	40	49	47	45
Meter Pressure, P_m	in Hg	28.79	28.80	28.79	28.79
Measured Sample Volume, V_m	ft^3	37.05	38.95	38.98	38.33
Sample Volume, V_m	std ft^3	37.39	38.68	38.85	38.31
Sample Volume, V_m	std m^3	1.06	1.10	1.10	1.08
Condensate Volume, V_w	std ft^3	9.19	13.06	9.94	10.73
Gas Density, ρ_s	std lb/ft^3	0.0700	0.0684	0.0698	0.0694
Total weight of sampled gas	lb	3.260	3.538	2.788	3.195
Nozzle Size, A_n	ft^2	0.0003274	0.0003274	0.0003274	0.0003274
Isokinetic Variation, I	%	101	104	102	102
Stack Data					
Average Stack Temperature, T_s	ºF	337	343	340	340
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	29.16	29.16	29.16	29.16
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	26.96	26.34	26.89	26.73
Stack Gas Specific Gravity, G_s		0.93	0.91	0.93	0.92
Percent Moisture, B_{ws}	%	19.74	25.24	20.37	21.78
Water Vapor Volume (fraction)		0.197	0.252	0.204	0.218
Pressure, P_s	in Hg	28.65	28.65	28.65	28.65
Average Stack Velocity, V_s	ft/sec	61.92	66.92	64.32	64.39
Area of Stack	ft^2	82.52	82.52	82.52	82.52
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	306,547	331,312	318,449	318,769
Flowrate	ft^3/min, standard wet	194,575	208,699	201,360	201,545
Flowrate	ft^3/min, standard dry	156,171	156,018	160,338	157,509
Flowrate	m^3/min, standard dry	4,422	4,418	4,540	4,460
Collected Mass					
Acetone Wash†	mg	12.1	8.1	5.8	8.7
Filter	mg	5.60	7.00	4.00	5.53
Total Filterable Particulate Matter (FPM)	mg	17.7	15.1	9.8	14.2
Inorganic CPM	mg	6.4	10	7.0	7.8
Organic CPM	mg	9.2	12	11	10.7
Field Train Recovery Blank‡	mg	2.0	2.0	2.0	2.0
Total Condensable Particulate Matter (CPM)	mg	13.6	20.0	16.0	16.5
Total FPM and CPM	mg	31.3	35.1	25.8	30.7
Concentration					
Total Filterable Particulate Matter (FPM)	mg/dscf	0.473	0.392	0.252	0.372
Total Filterable Particulate Matter (FPM)	grain/dscf	0.00730	0.00604	0.00389	0.00574
Total Condensable Particulate Matter (CPM)	mg/dscf	0.364	0.517	0.412	0.431
Total Condensable Particulate Matter (CPM)	grain/dscf	0.00561	0.00798	0.00636	0.00665
Total FPM and CPM	mg/dscf	0.837	0.909	0.664	0.803
Total FPM and CPM	grain/dscf	0.0129	0.014	0.010	0.0124
Mass Emission Rate					
FPM	lb/hr	9.77	8.08	5.34	7.73
CPM	lb/hr	7.51	10.67	8.74	8.97
Total FPM and CPM	lb/hr	17.28	18.75	14.08	16.70

† Blank corected following USEPA Method 5 procedures.
‡ Field train recovery blank is subtracted from the sum of the inorganic and organic CPM to calculate the Total Condensable Particulate Matter (CPM).

Table 3

BH11 and BH13 Gaseous Results

Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Dates: March 3 and 4, 2021

Parameter		Run 1	Run 2	Run 3	Average
BH11	Date	3/3/2021	3/3/2021	3/3/2021	
	Run Time	7:22-8:22	8:43-9:43	10:00-11:00	
	Exhaust Gas Stream Volumetric Flowrate (scfm)	51,371	49,776	50,533	**50,560**
	VOC Concentration (ppmvw)	12.1	13.4	15.3	**13.6**
	Corrected VOC Concentration (C_{gas})†	12.1	13.4	15.3	**13.6**
	VOC Mass Emission Rate (lb/hr)	4.28	4.59	5.32	**4.73**
BH13	Date	3/4/2021	3/4/2021	3/4/2021	
	Run Time	7:59-8:59	9:31-10:31	10:50-11:50	
	Exhaust Gas Stream Volumetric Flowrate (scfm)	33,100	32,938	31,854	**32,631**
	VOC Concentration (ppmvw)	6.7	7.2	4.9	**6.3**
	Corrected VOC Concentration (C_{gas})†	6.6	7.0	4.9	**6.2**
	VOC Mass Emission Rate (lb/hr)	1.51	1.59	1.06	**1.39**
EUFORMING (BH11+BH13)	VOC Mass Emission Rate (lb/hr)	**5.79**	**6.18**	**6.39**	**6.12**

ppmvw: part per million by volume, wet basis
ppmvd: part per million by volume, dry basis
lb/hr: pound per hour
scfm: wet standard cubic feet per minute
dscfm: dry standard cubic feet per minute

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Table 4
BH11 Particulate Matter Results
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 3, 2021

Meter/Nozzle Information		Run 1	Run 2	Run 3	Average
Meter Temperature, T_m	ºF	28	33	43	35
Meter Pressure, P_m	in Hg	29.98	29.97	29.98	29.98
Measured Sample Volume,V_m	ft^3	37.99	37.31	40.35	38.55
Sample Volume, V_m	std ft^3	40.93	39.76	42.20	40.96
Sample Volume, V_m	std m^3	1.16	1.13	1.19	1.16
Condensate Volume, V_w	std ft^3	0.40	0.52	0.51	0.48
Gas Density, ρ_s	std lb/ft^3	0.0746	0.0745	0.0745	0.0745
Total weight of sampled gas	lb	3.083	3.001	3.234	3.106
Nozzle Size, A_n	ft^2	0.0001767	0.0001767	0.0001767	0.0001767
Isokinetic Variation, I	%	100	101	105	102
Stack Data					
Average Stack Temperature, T_s	ºF	81	82	82	82
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.74	28.70	28.71	28.71
Stack Gas Specific Gravity, G_s		0.99	0.99	0.99	0.99
Percent Moisture, B_{ws}	%	0.96	1.30	1.20	1.15
Water Vapor Volume (fraction)		0.010	0.013	0.012	0.012
Pressure, P_s	in Hg	29.96	29.96	29.96	29.96
Average Stack Velocity, V_s	ft/sec	66.20	64.30	65.28	65.26
Area of Stack	ft^2	13.23	13.23	13.23	13.23
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	52,548	51,042	51,819	51,803
Flowrate	ft^3/min, standard wet	51,371	49,776	50,533	50,560
Flowrate	ft^3/min, standard dry	50,879	49,130	49,925	49,978
Flowrate	m^3/min, standard dry	1,441	1,391	1,414	1,415
Collected Mass					
Acetone Wash†	mg	3.3	3.2	3.1	3.2
Filter	mg	<0.30	<0.30	<0.30	<0.30
Total Filterable Particulate Matter (FPM)	mg	3.6	3.5	3.4	3.5
Inorganic CPM	mg	3.3	1.9	1.6	2.3
Organic CPM	mg	3.7	1.6	3.6	3.0
Field Train Recovery Blank*	mg	2.0	2.0	2.0	2.0
Total Condensable Particulate Matter (CPM)	mg	5.0	1.5	3.2	3.2
Total FPM and CPM	mg	8.6	5.0	6.6	6.7
Concentration					
Total Filterable Particulate Matter (FPM)	mg/dscf	0.0877	0.0885	0.0794	0.0852
Total Filterable Particulate Matter (FPM)	grain/dscf	0.0014	0.0014	0.0012	0.0013
Total Condensable Particulate Matter (CPM)	mg/dscf	0.122	0.038	0.076	0.079
Total Condensable Particulate Matter (CPM)	grain/dscf	0.0019	0.00058	0.0012	0.0012
Total FPM and CPM	mg/dscf	0.210	0.126	0.155	0.164
Total FPM and CPM	grain/dscf	0.0032	0.0019	0.0024	0.0025
Mass Emission Rate					
FPM	lb/hr	0.59	0.58	0.52	0.56
CPM	lb/hr	0.82	0.25	0.50	0.52
Total FPM and CPM	lb/hr	1.41	0.82	1.03	1.09

† Blank corected following USEPA Method 5 procedures.

* = Field train recovery blank is subtracted from the sum of the inorganic and organic CPM to calculate the Total Condensable Particulate Matter (CPM).

Table 5
BH13 Particulate Matter Results
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 4, 2021

Meter/Nozzle Information		Run 1	Run 2	Run 3	Average
Meter Temperature, T_m	ºF	18	20	22	20
Meter Pressure, P_m	in Hg	29.80	29.80	29.79	29.80
Measured Sample Volume,V_m	ft^3	39.73	39.89	38.65	39.42
Sample Volume, V_m	std ft^3	43.50	43.44	41.91	42.95
Sample Volume, V_m	std m^3	1.23	1.23	1.19	1.22
Condensate Volume, V_w	std ft^3	0.42	0.27	0.32	0.34
Gas Density, ρ_s	std lb/ft^3	0.0746	0.0747	0.0747	0.0746
Total weight of sampled gas	lb	3.276	3.265	3.217	3.253
Nozzle Size, A_n	ft^2	0.0001767	0.0001767	0.0001767	0.0001767
Isokinetic Variation, I	%	105	105	105	105
Stack Data					
Average Stack Temperature, T_s	ºF	67	67	67	67
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.74	28.77	28.76	28.76
Stack Gas Specific Gravity, G_s		0.99	0.99	0.99	0.99
Percent Moisture, B_{ws}	%	0.96	0.63	0.75	0.78
Water Vapor Volume (fraction)		0.010	0.006	0.007	0.008
Pressure, P_s	in Hg	29.61	29.61	29.61	29.61
Average Stack Velocity, V_s	ft/sec	66.22	65.89	63.72	65.28
Area of Stack	ft^2	8.40	8.40	8.40	8.40
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	33,387	33,218	32,124	32,910
Flowrate	ft^3/min, standard wet	33,100	32,938	31,854	32,631
Flowrate	ft^3/min, standard dry	32,784	32,732	31,616	32,377
Flowrate	m^3/min, standard dry	928	927	895	917
Collected Mass					
Acetone Wash†	mg	6.4	2.1	1.8	3.4
Filter	mg	<0.30	<0.30	<0.30	<0.30
Total Filterable Particulate Matter (FPM)	mg	6.7	2.4	2.1	3.7
Inorganic CPM	mg	1.5	1.2	1.8	1.5
Organic CPM	mg	2.2	2.0	<1.0	1.7
Field Train Recovery Blank‡	mg	2.0	2.0	2.0	2.0
Total Condensable Particulate Matter (CPM)	mg	1.7	1.2	0.8	1.2
Total FPM and CPM	mg	8.4	3.6	2.9	4.9
Concentration					
Total Filterable Particulate Matter (FPM)	mg/dscf	0.153	0.055	0.049	0.086
Total Filterable Particulate Matter (FPM)	grain/dscf	0.0024	0.00085	0.00076	0.0013
Total Condensable Particulate Matter (CPM)	mg/dscf	0.039	0.028	0.019	0.029
Total Condensable Particulate Matter (CPM)	grain/dscf	0.00060	0.00043	0.00029	0.00044
Total FPM and CPM	mg/dscf	0.192	0.083	0.068	0.114
Total FPM and CPM	grain/dscf	0.0030	0.0013	0.0011	0.0018
Mass Emission Rate					
FPM	lb/hr	0.66	0.24	0.20	0.37
CPM	lb/hr	0.17	0.12	0.080	0.12
Total FPM and CPM	lb/hr	0.83	0.36	0.28	0.49

† Blank corected following USEPA Method 5 procedures.

‡ Field train recovery blank is subtracted from the sum of the inorganic and organic CPM to calculate the Total Condensable Particulate Matter (CPM).

Table 6

Press Gaseous Results

Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 5, 2021

Parameter	Run 1	Run 2	Run 3	Average
Run Time	8:47-9:47	11:52-12:52	13:15-14:15	
Board Production Rate (1000 ft^2, 3/4" basis)	63.56	62.10	64.07	**63.24**
Exhaust Gas Stream Volumetric Flowrate (scfm)	73,047	73,199	71,518	**72,588**
Exhaust Gas Stream Volumetric Flowrate (dscfm)	70,913	71,050	68,983	**70,315**
NOx Concentration (ppmvd)	2.5	1.8	2.3	**2.2**
Corrected NO_x Concentration (C_{gas})†	2.6	1.8	2.0	**2.1**
NOx Mass Emission Rate (lb/hr)	1.3	0.9	1.0	**1.1**
NOx Mass Emission Rate (lb/1000 ft^2, 3/4" basis)	0.021	0.014	0.016	**0.017**
CO Concentration (ppmvd)	4.3	3.0	3.0	**3.4**
Corrected CO Concentration (C_{gas})†	4.7	3.5	3.5	**3.9**
CO Mass Emission Rate (lb/hr)	1.44	1.10	1.04	**1.19**
CO Mass Emission Rate (lb/1000 ft^2, 3/4" basis)	0.023	0.018	0.016	**0.019**
VOC Concentration (ppmvw)	52.4	39.6	46.0	**46.0**
Corrected VOC Concentration (C_{gas})†	52.1	39.6	46.0	**45.9**
VOC Mass Emission Rate (lb/hr)	26.2	19.9	22.6	**22.9**
VOC Mass Emission Rate (lb/1000 ft^2, 3/4" basis)	0.412	0.321	0.353	**0.362**

ppmvw: part per million by volume, wet basis
ppmvd: part per million by volume, dry basis
lb/hr: pound per hour
scfm: wet standard cubic feet per minute
dscfm: dry standard cubic feet per minute

APEX

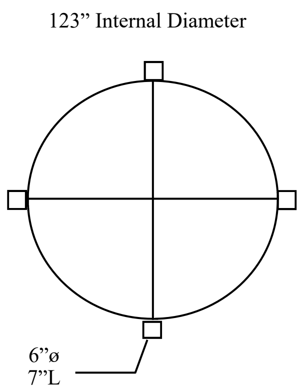
Table 7
Press Particulate Matter Results
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 5, 2021

Meter/Nozzle Information		Run 1	Run 2	Run 3	Average
Meter Temperature, T_m	ºF	26	34	38	33
Meter Pressure, P_m	in Hg	30.39	30.39	30.39	30.39
Measured Sample Volume, V_m	ft^3	38.11	36.28	37.76	37.38
Sample Volume, V_m	std ft^3	41.84	39.14	40.41	40.46
Sample Volume, V_m	std m^3	1.18	1.11	1.14	1.15
Condensate Volume, V_w	std ft^3	1.26	1.18	1.49	1.31
Gas Density, ρ_s	std lb/ft^3	0.0740	0.0740	0.0739	0.0740
Total weight of sampled gas	lb	3.191	2.985	3.070	3.082
Nozzle Size, A_n	ft^2	0.0001767	0.0001767	0.0001767	0.0001767
Isokinetic Variation, I	%	109	102	108	107
Stack Data					
Average Stack Temperature, T_s	ºF	88	90	90	90
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.52	28.52	28.46	28.50
Stack Gas Specific Gravity, G_s		0.98	0.98	0.98	0.98
Percent Moisture, B_{ws}	%	2.92	2.94	3.54	3.13
Water Vapor Volume (fraction)		0.029	0.029	0.035	0.031
Pressure, P_s	in Hg	30.40	30.40	30.40	30.40
Average Stack Velocity, V_s	ft/sec	63.37	63.70	62.27	63.11
Area of Stack	ft^2	19.63	19.63	19.63	19.63
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	74,655	75,049	73,359	74,355
Flowrate	ft^3/min, standard wet	73,047	73,199	71,518	72,588
Flowrate	ft^3/min, standard dry	70,913	71,050	68,983	70,315
Flowrate	m^3/min, standard dry	2,008	2,012	1,953	1,991
Collected Mass					
Acetone Wash†	mg	1.6	3.6	8.7	4.6
Filter	mg	2.80	1.50	2.00	2.10
Total Filterable Particulate Matter (FPM)	mg	4.4	5.1	10.7	6.7
Inorganic CPM	mg	5.1	5.1	5.5	5.2
Organic CPM	mg	5.2	5.2	7.8	6.1
Field Train Recovery Blank‡	mg	2.0	2.0	2.0	2.0
Total Condensable Particulate Matter (CPM)	mg	8.3	8.3	11.3	9.3
Total FPM and CPM	mg	12.7	13.4	22.0	16.0
Concentration					
Total Filterable Particulate Matter (FPM)	mg/dscf	0.104	0.131	0.264	0.166
Total Filterable Particulate Matter (FPM)	grain/dscf	0.00161	0.00201	0.00407	0.00256
Total Condensable Particulate Matter (CPM)	mg/dscf	0.198	0.212	0.280	0.230
Total Condensable Particulate Matter (CPM)	grain/dscf	0.00306	0.00327	0.00432	0.00355
Total FPM and CPM	mg/dscf	0.303	0.343	0.543	0.396
Total FPM and CPM	grain/dscf	0.00467	0.00529	0.00839	0.00611
Mass Emission Rate					
FPM	lb/hr	0.98	1.23	2.41	1.54
CPM	lb/hr	1.86	1.99	2.55	2.14
Total FPM and CPM	lb/hr	2.84	3.22	4.96	3.67

† Blank corected following USEPA Method 5 procedures.

‡ Field train recovery blank is subtracted from the sum of the inorganic and organic CPM to calculate the Total Condensable Particulate Matter (CPM).

Figures



Traverse Point	Distance From Stack Wall (inches)
6	2.6
5	8.2
4	14.5
3	21.8
2	30.8
1	43.8

	Distance From Ports to Nearest Upstream Bend/ Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
FGDRYERRTO Outlet	33 feet (3.2 diameter)	39 feet (3.8 diameter)

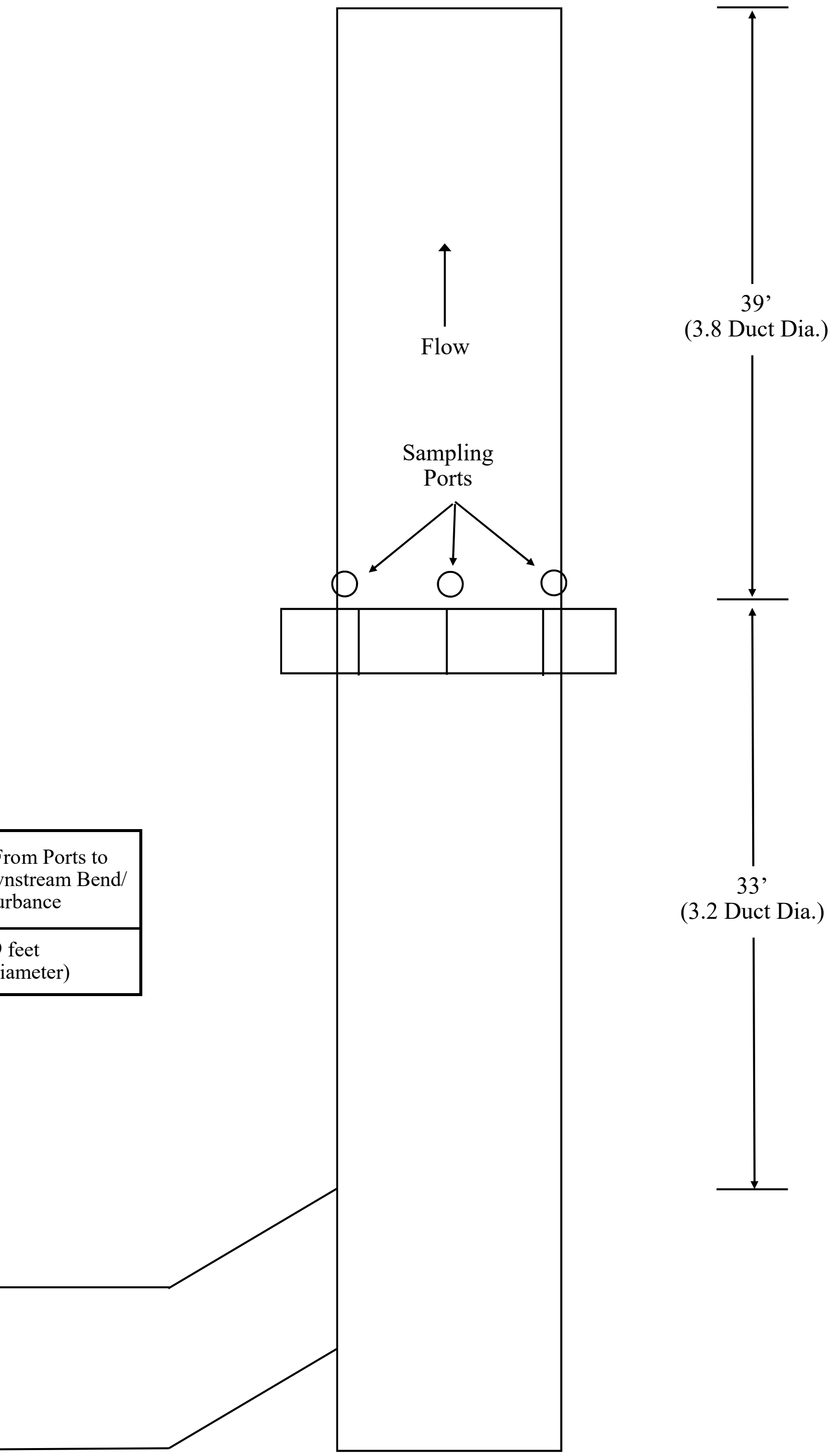


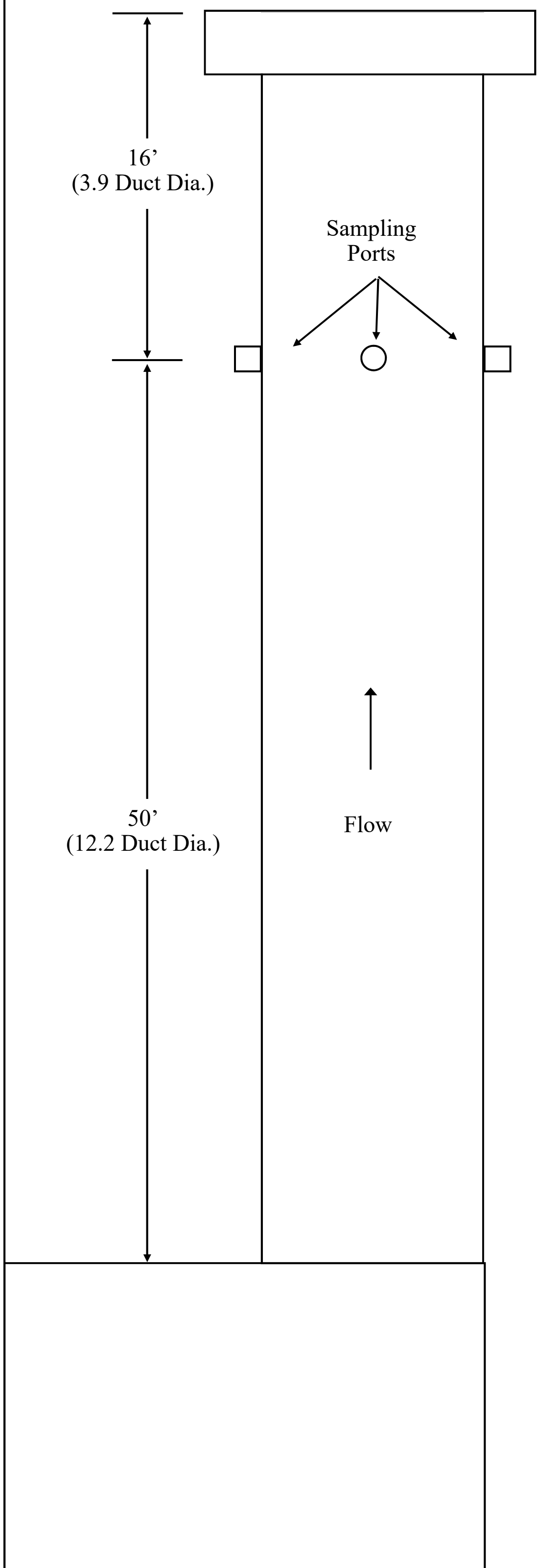
Figure 1
FGDRYERRTO Outlet Sampling Ports and Traverse Point Locations

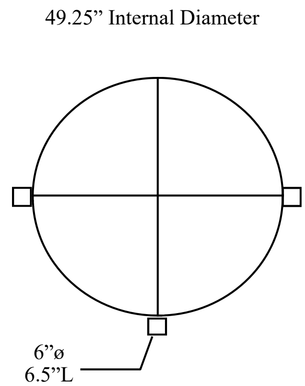
APEX

Arauco North America
5851 Arauco Road
Grayling, Michigan

Project No. 11020-000020.00

Last Revision: March 24, 2021





	Distance From Ports to Nearest Upstream Bend/Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
EUFORMING BH11 Outlet	50 feet (12.2 diameter)	16 feet (3.9 diameter)

Traverse Point	**Distance From Stack Wall (inches)**
6	2.2
5	7.2
4	14.6
3	34.7
2	42.1
1	47.1

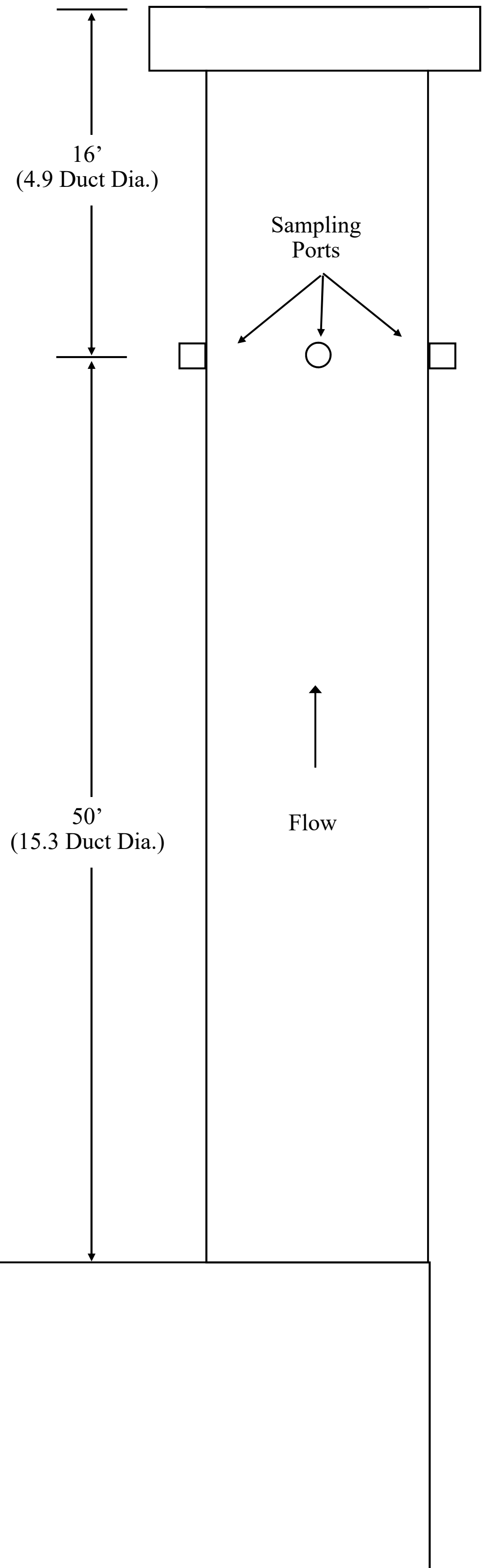
Figure 2
EUFORMING BH11 Outlet
Sampling Ports and Traverse Point Locations

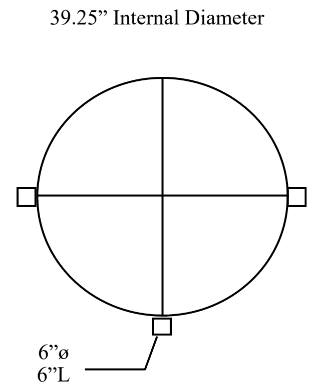
APEX

Arauco North America
5851 Arauco Road
Grayling, Michigan

Project No. 11020-000020.00

Last Revision: March 24, 2021





	Distance From Ports to Nearest Upstream Bend/Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
EUFORMING BH13 Outlet	50 feet (15.3 diameter)	16 feet (4.9 diameter)

Traverse Point	**Distance From Stack Wall (inches)**
6	1.7
5	5.7
4	11.6
3	27.6
2	33.5
1	37.5

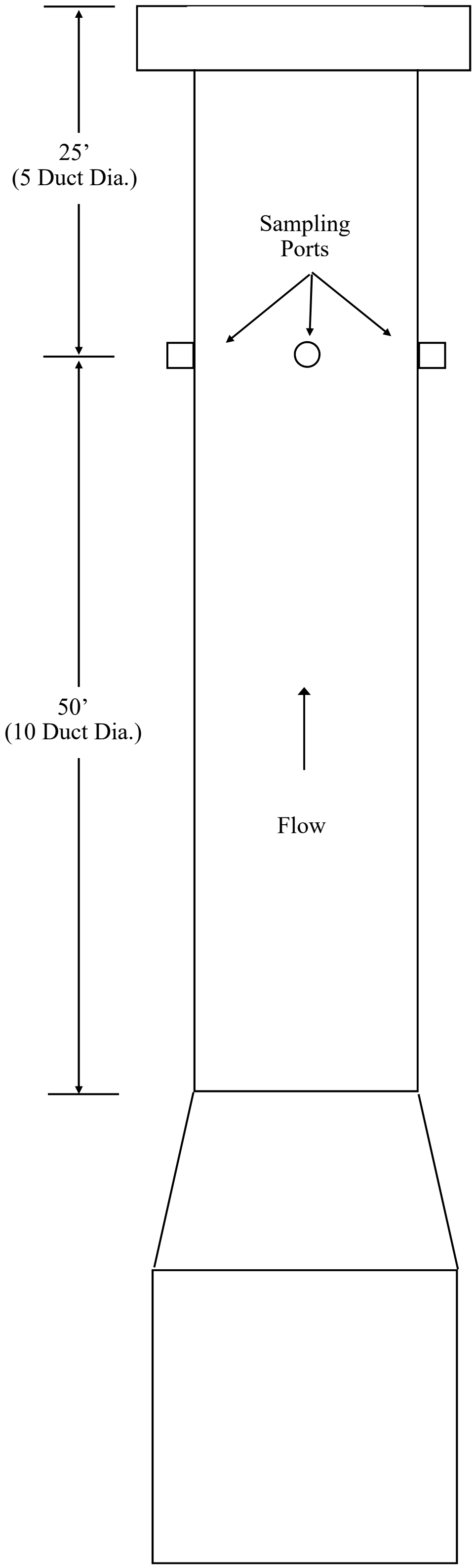
Figure 3
EUFORMING BH13 Outlet
Sampling Ports and Traverse Point Locations

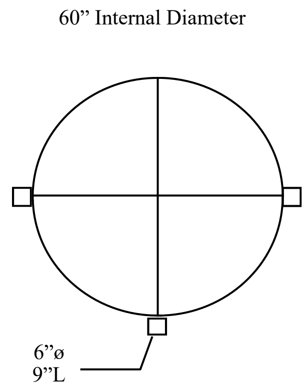
APEX

Arauco North America
5851 Arauco Road
Grayling, Michigan

Project No. 11020-000020.00

Last Revision: March 24, 2021





	Distance From Ports to Nearest Upstream Bend/Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
FGPRESSCOOL Outlet	50 feet (10.0 diameter)	25 feet (5.0 diameter)

Traverse Point	**Distance From Stack Wall (inches)**
6	2.6
5	8.8
4	17.8
3	42.2
2	51.2
1	57.4

Figure 4
FGPRESSCOOL Outlet Sampling Ports and Traverse Point Locations

APEX

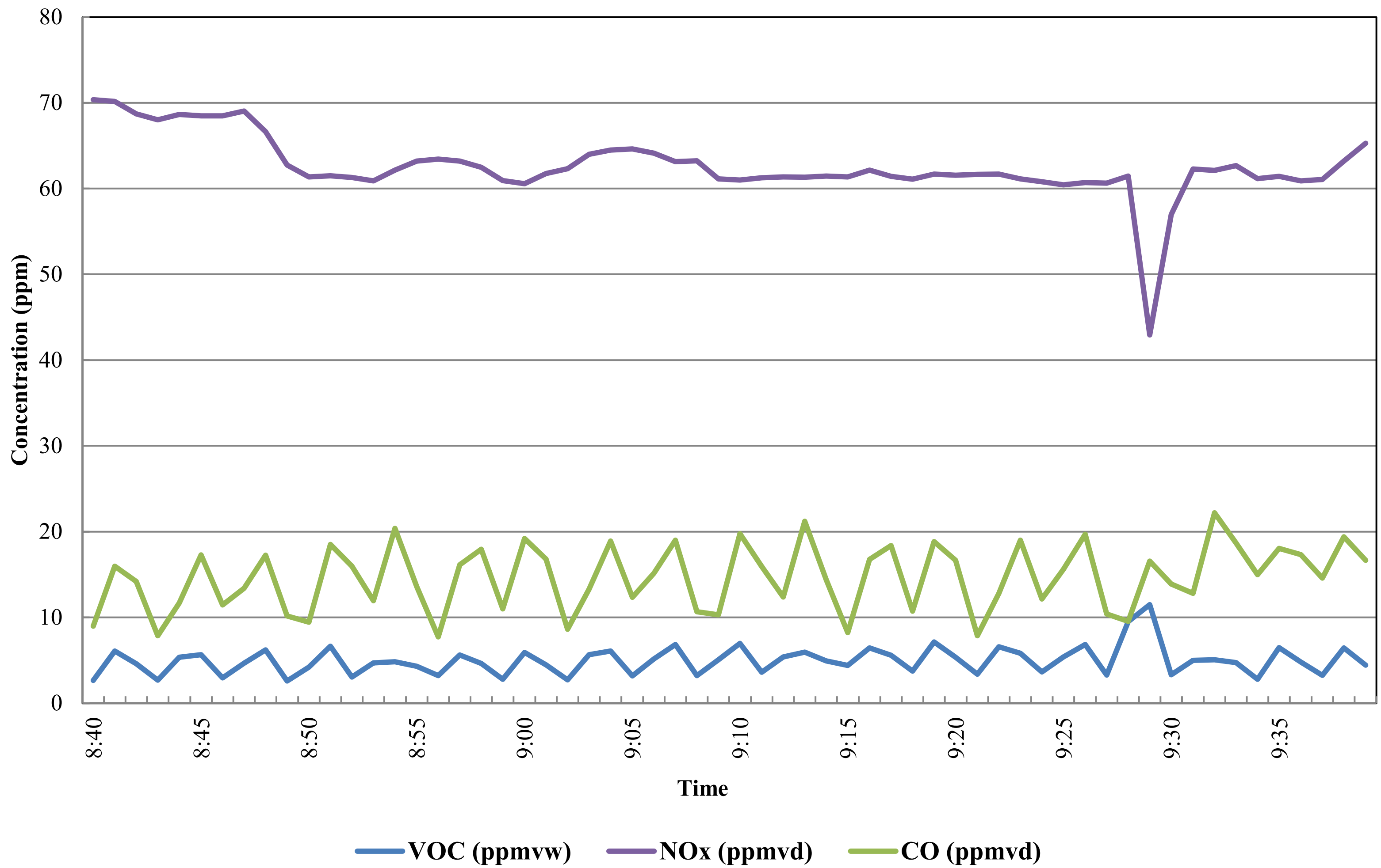
Arauco North America
5851 Arauco Road
Grayling, Michigan

Project No. 11020-000020.00

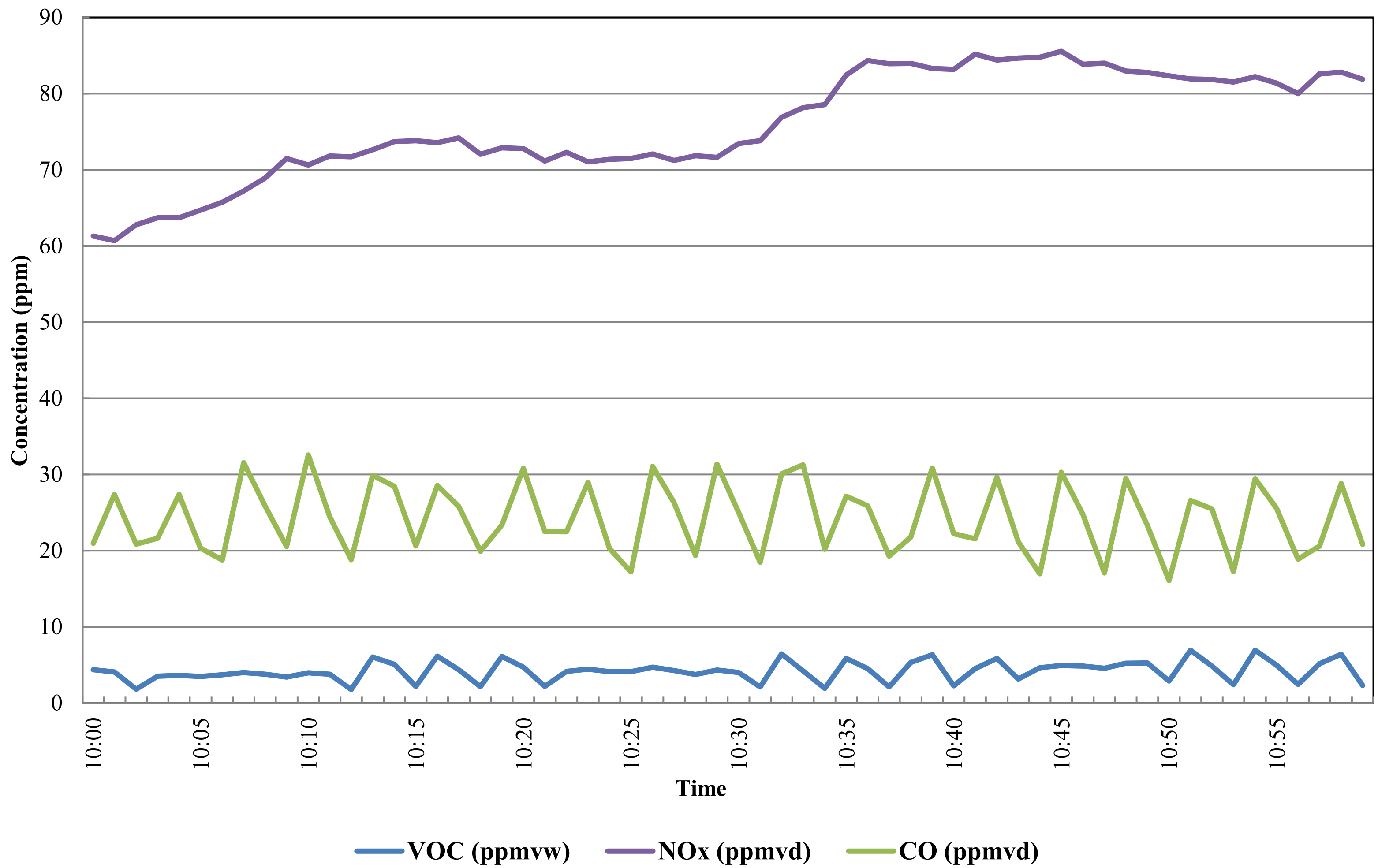
Last Revision: March 24, 2021

Graphs

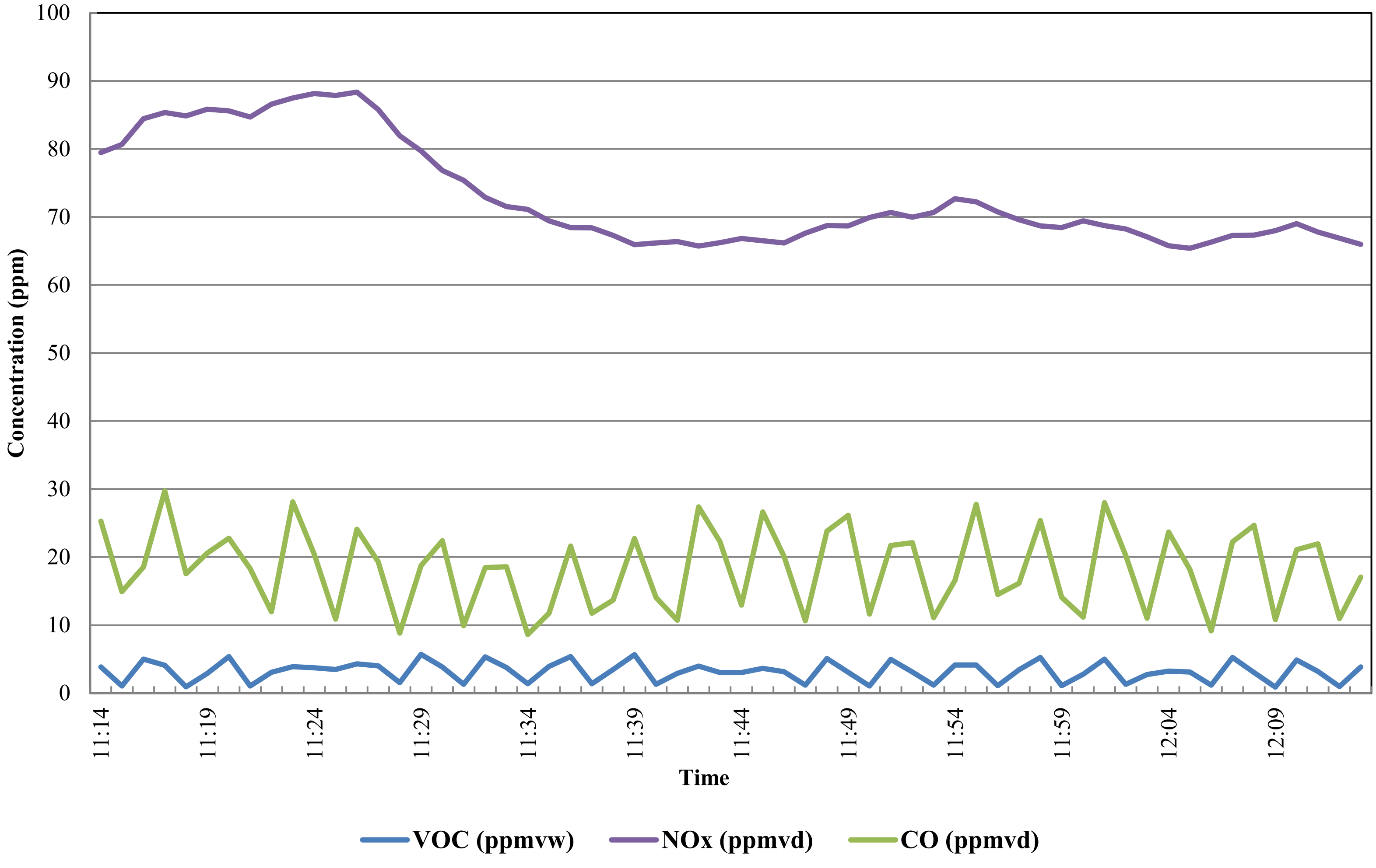
RTO Gaseous Concentrations - Run 1
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 2, 2021



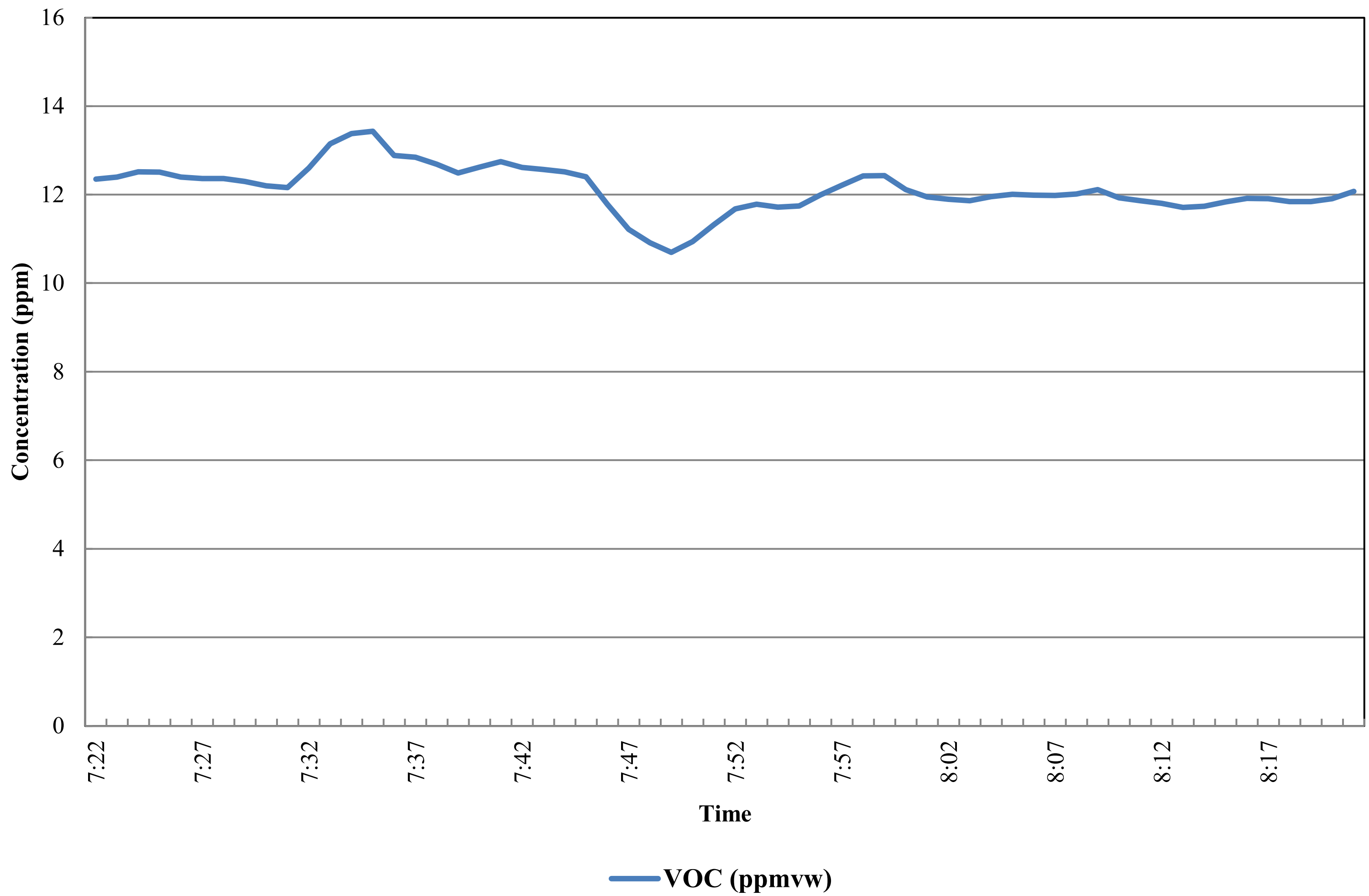
RTO Gaseous Concentrations - Run 2
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 2, 2021



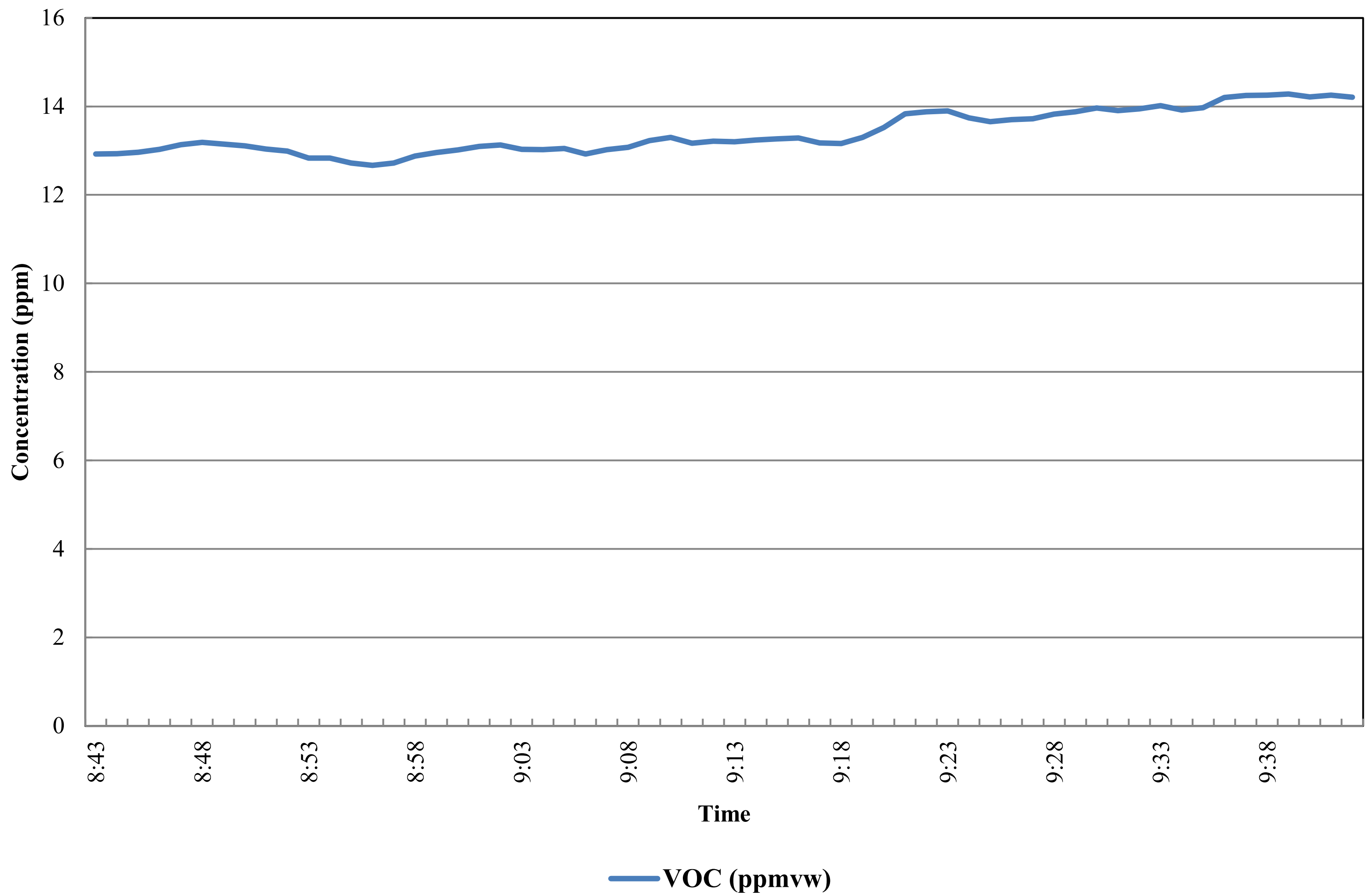
RTO Gaseous Concentrations - Run 3
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 2, 2021

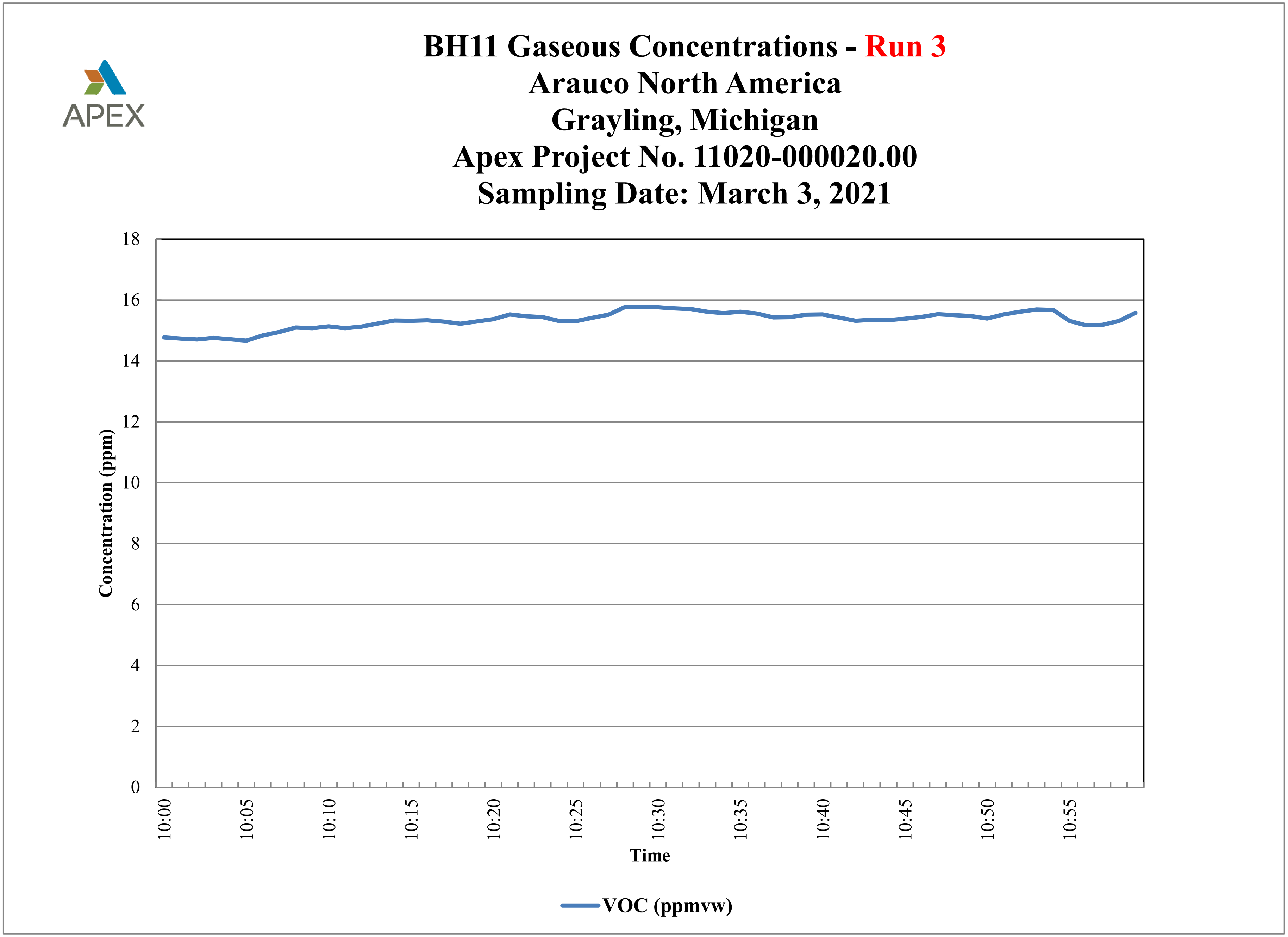


BH11 Gaseous Concentrations - Run 1
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 3, 2021

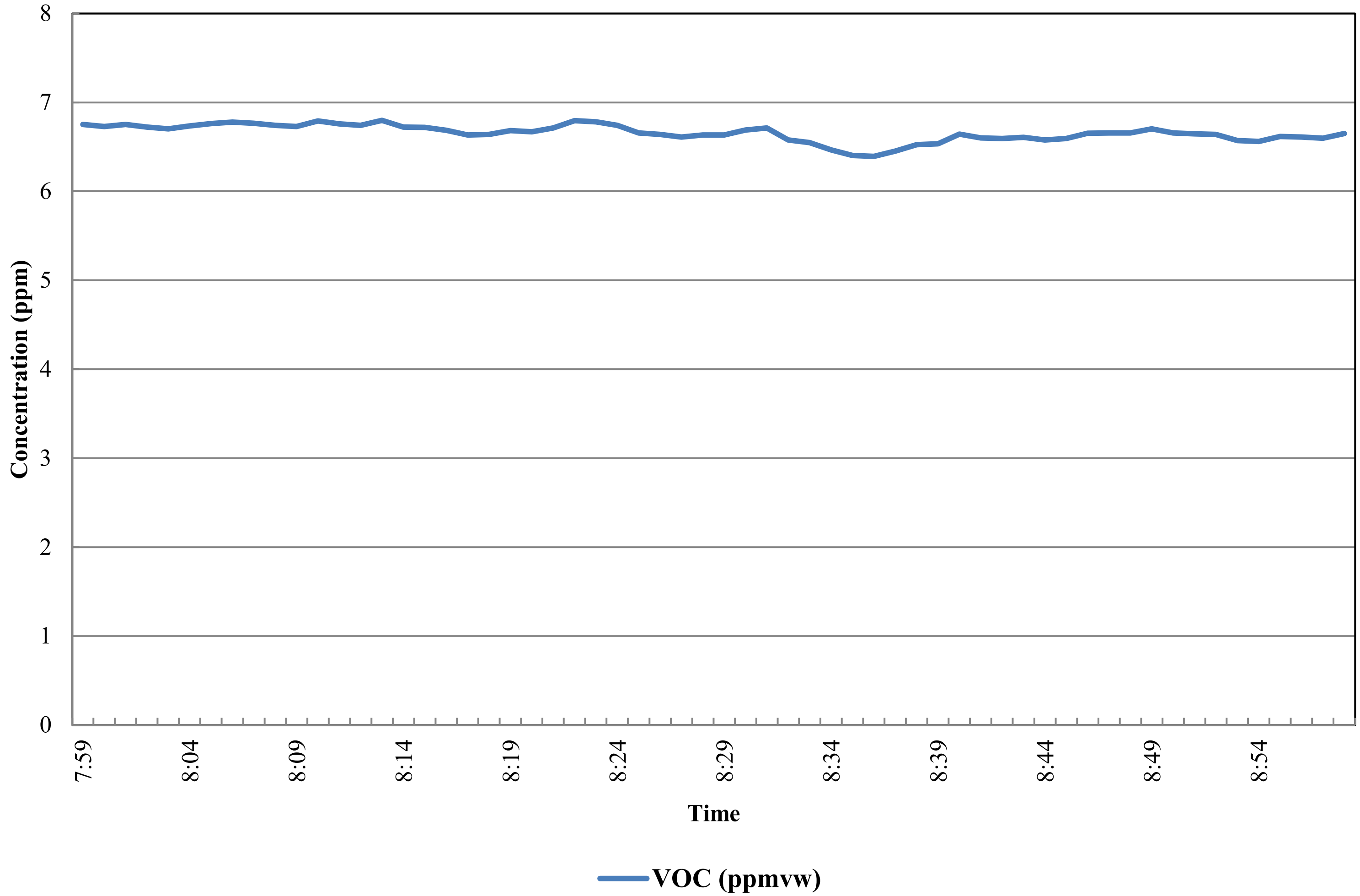


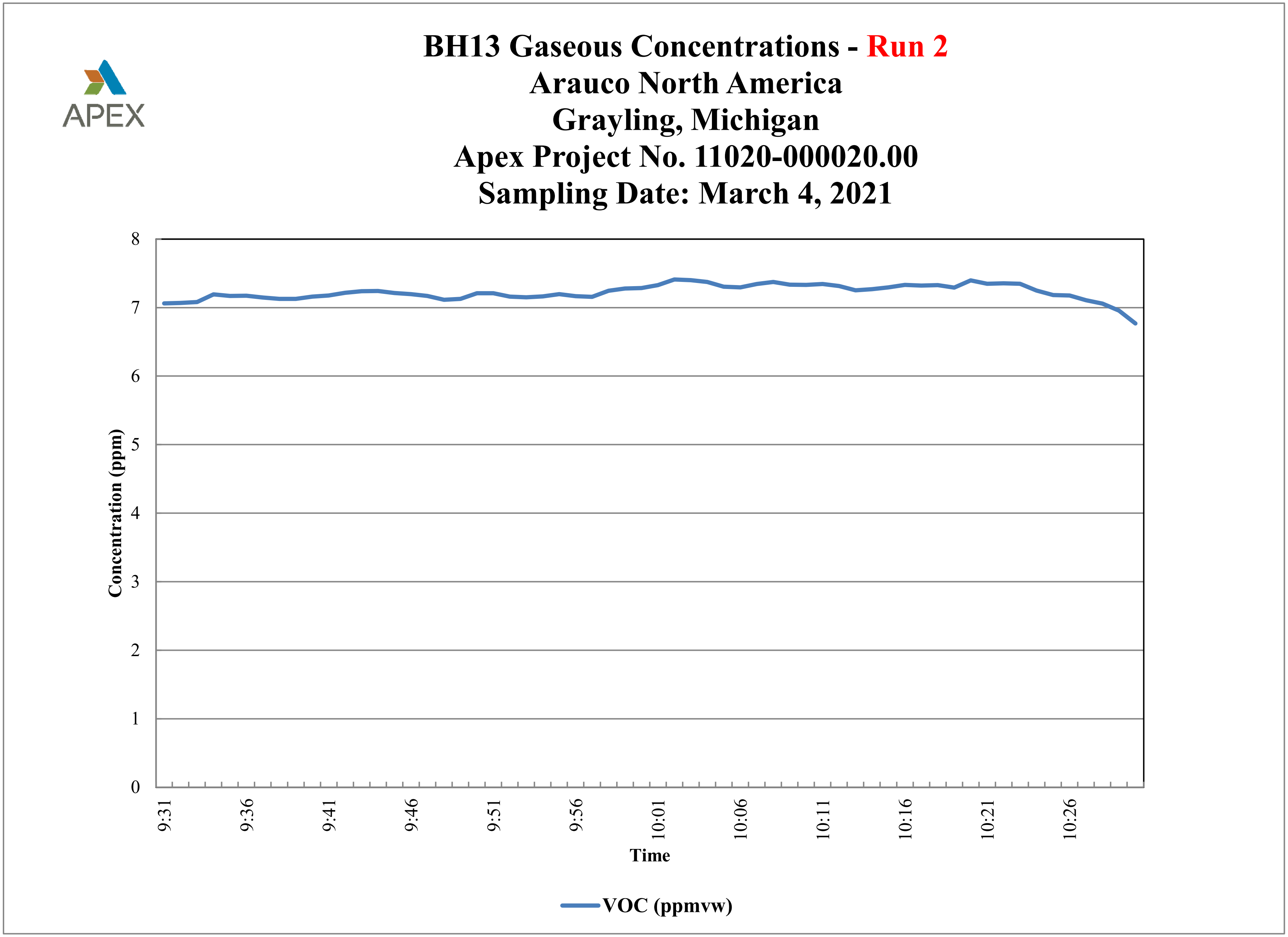
BH11 Gaseous Concentrations - Run 2
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 3, 2021




BH11 Gaseous Concentrations - Run 3
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 3, 2021
APEX
Concentration (ppm)
18
16
14
12
10
8
6
4
2
0
10:00
10:05
10:10
10:15
10:20
10:25
10:30
10:35
10:40
10:45
10:50
10:55
Time
VOC (ppmvw)

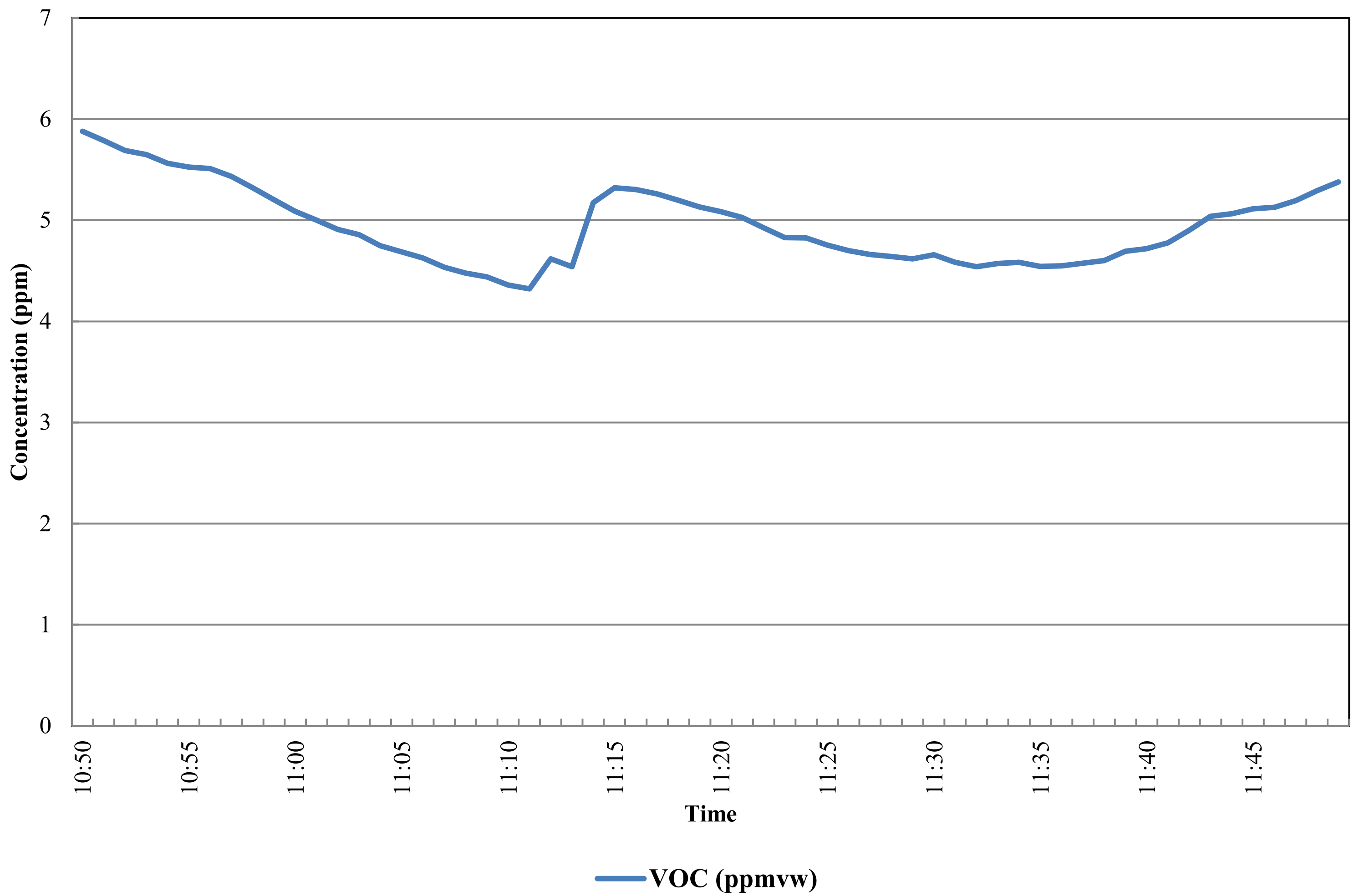
BH13 Gaseous Concentrations - Run 1
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 4, 2021



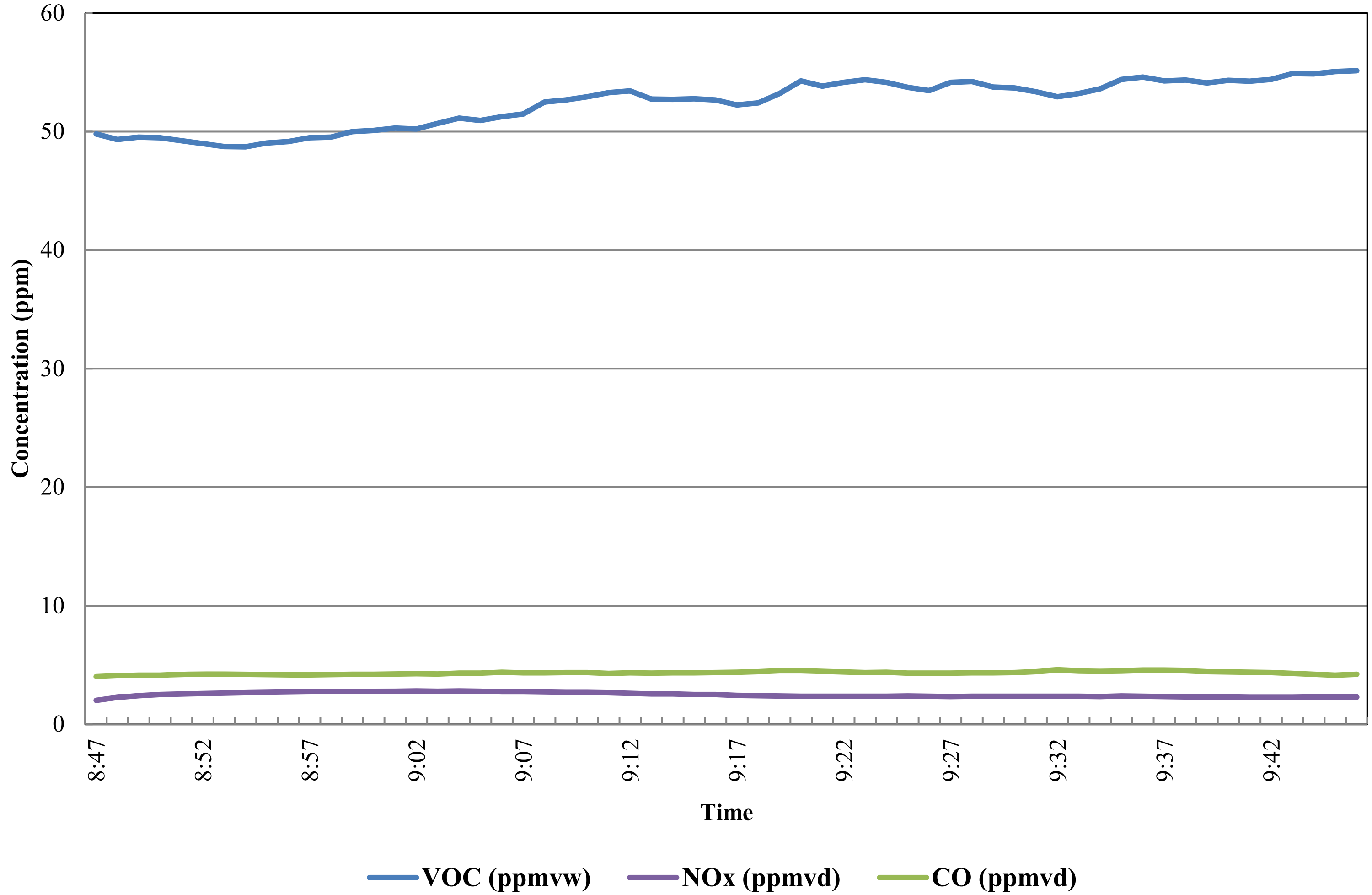


BH13 Gaseous Concentrations - Run 2
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 4, 2021
APEX
Concentration (ppm)
0
1
2
3
4
5
6
7
8
9:31
9:36
9:41
9:46
9:51
9:56
10:01
10:06
10:11
10:16
10:21
10:26
Time
VOC (ppmvw)

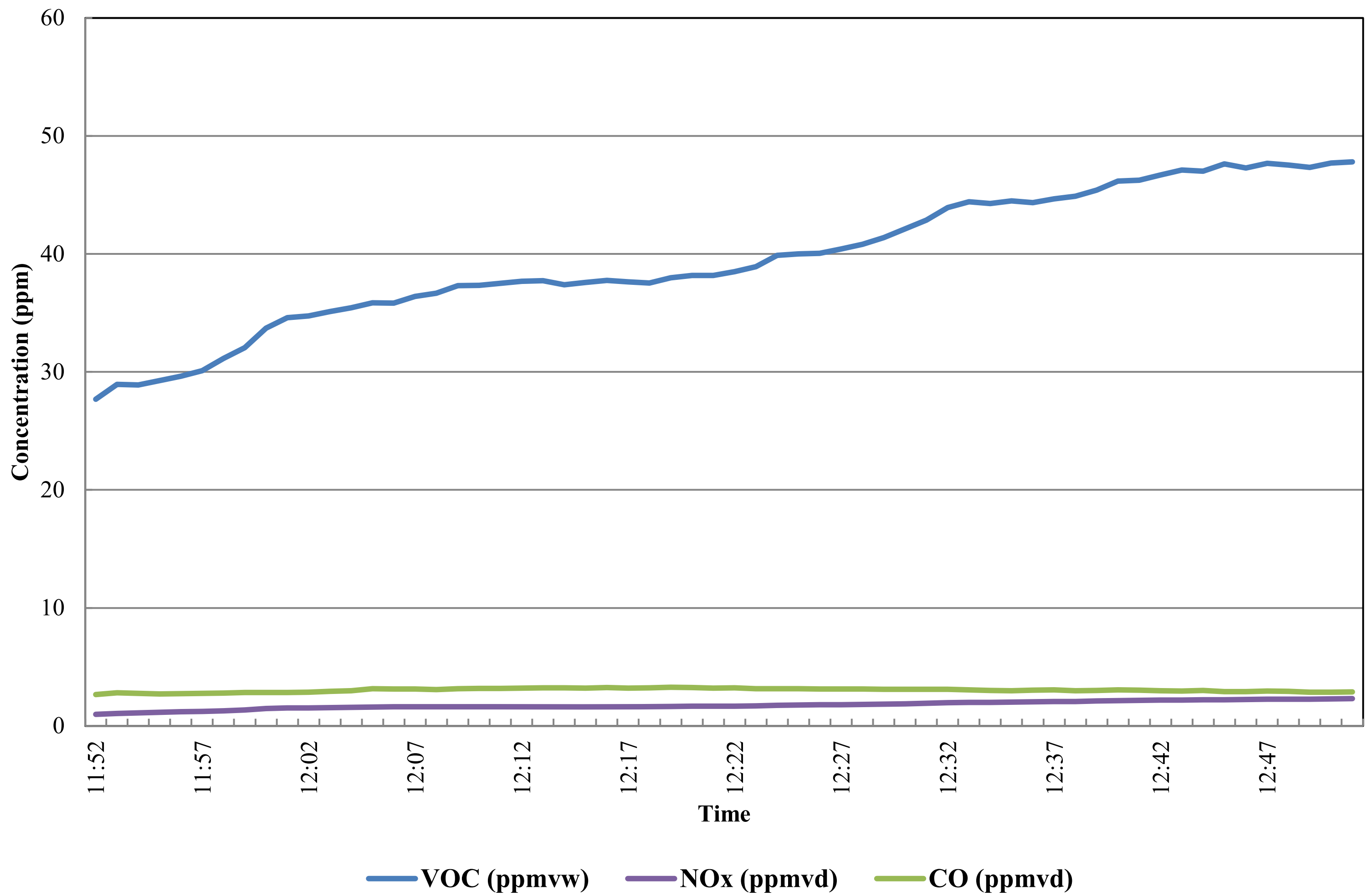
BH13 Gaseous Concentrations - Run 3
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 4, 2021

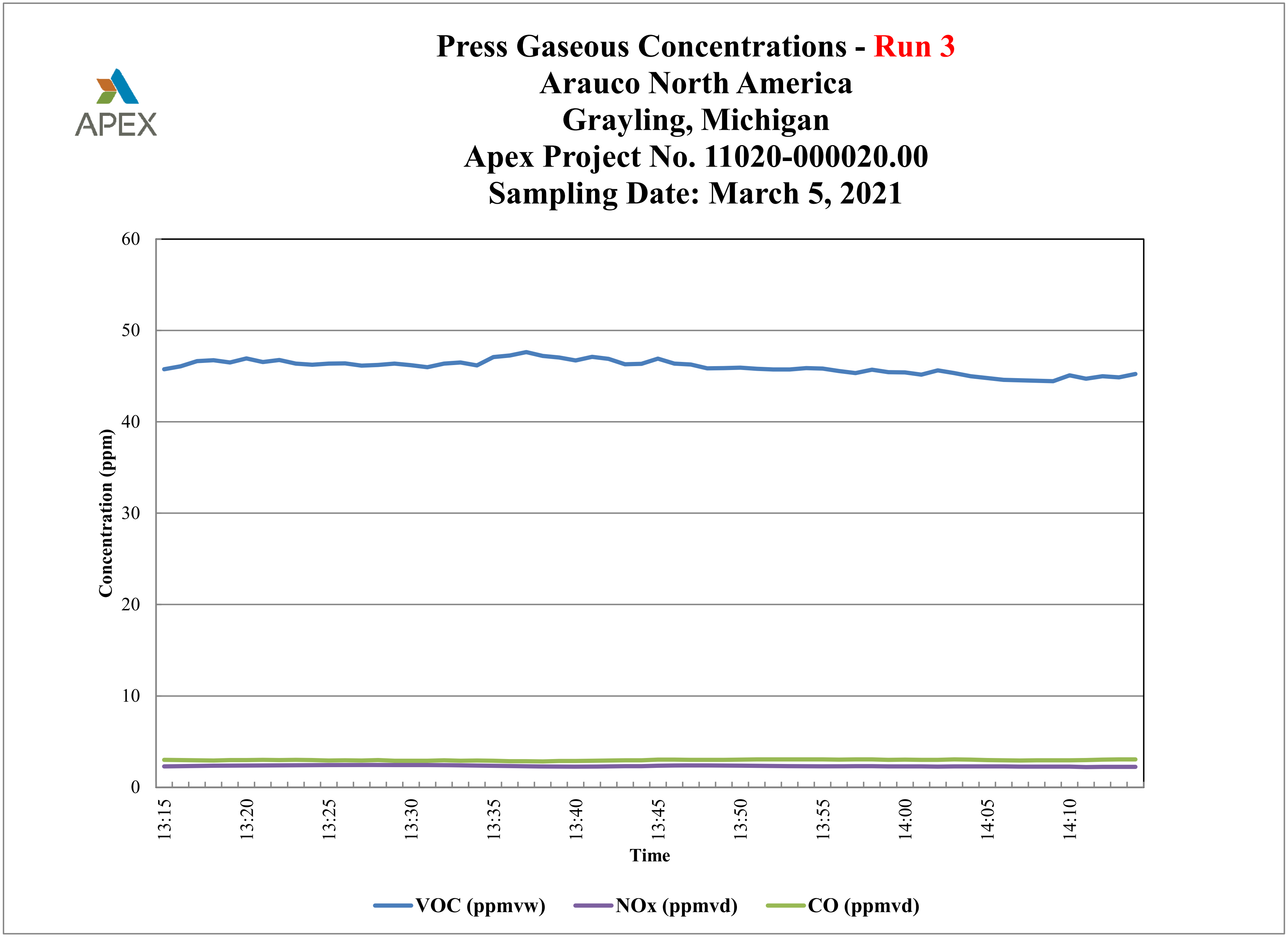


Press Gaseous Concentrations - Run 1
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 5, 2021



Press Gaseous Concentrations - Run 2
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 5, 2021





Press Gaseous Concentrations - Run 3
Arauco North America
Grayling, Michigan
Apex Project No. 11020-000020.00
Sampling Date: March 5, 2021
APEX
Concentration (ppm)
60
50
40
30
20
10
0
13:15
13:20
13:25
13:30
13:35
13:40
13:45
13:50
13:55
14:00
14:05
14:10
Time
VOC (ppmvw)
NOx (ppmvd)
CO (ppmvd)

Appendix A
Calibration and Inspection Sheets

APEX

Fyrite Calibration Using Standard

Operator	DK	Model No.	Fyrite #1
Date	January 4, 2021	Apex Asset No.	01824
Time	11:04		

	Certified Cylinder Value (O2%)	Fyrite Response (O2%)	Certified Cylinder Value (CO2%)	Fyrite Response (CO2%)
Low-level (or zero) calibration gas	0%	0.0%	0%	0.0%
Mid-level calibration gas	11.04%	11.0%	11.10%	11.0%
High-level calibration gas	19.94%	20.0%	19.78%	20.0%

Operator	DK	Model No.	Fyrite #2
Date	January 4, 2021	Apex Asset No.	01825
Time	11:17		

	Certified Cylinder Value (O2%)	Fyrite Response (O2%)	Certified Cylinder Value (CO2%)	Fyrite Response (CO2%)
Low-level (or zero) calibration gas	0%	0.0%	0%	0.0%
Mid-level calibration gas	11.04%	11.0%	11.10%	11.0%
High-level calibration gas	19.94%	20.0%	19.78%	20.0%

Completed by: David Kawasaki

*** Must be accurate within 0.5%

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

DATE:	2/25/2021	METER SERIAL #:	2	BAROMETRIC PRESSURE (in Hg):	INITIAL 29.4	FINAL 29.4
METER PART #:		CRITICAL ORIFICE SET SERIAL #:	JR			

AVG (P_{bar}): 29.4

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y % Diff to Average Y	Y % Diff with other orifices	$\Delta H_@$
55	1	0.453	13	727.819	733.012	5.193	46	46	49	46	49	47.5	9.00	1.1	5.3246	5.3302	1.001			1.81
	2	0.453	13	733.012	738.220	5.208	46	49	51	49	51	50	9.00	1.1	5.3138	5.3302	1.003			1.80
	3	0.453	13	738.220	743.648	5.428	46	51	54	51	54	52.5	9.00	1.1	5.5112	5.3302	0.967			1.79
																AVG =	0.990	-0.39	-0.12	
63	1	0.5788	10	743.648	749.303	5.655	46	52	54	52	54	53	7.50	1.8	5.7461	5.6754	0.988			1.80
	2	0.5788	10	749.303	754.925	5.622	46	54	55	54	55	54.5	7.50	1.8	5.6959	5.6754	0.996			1.79
	3	0.5788	10	754.925	760.585	5.660	46	55	55	55	55	55	7.50	1.8	5.7288	5.6754	0.991			1.79
																AVG =	0.992	-0.27	0.12	
73	1	0.8049	14	760.585	765.703	5.118	46	54	55	54	55	54.5	5.00	3.7	5.2098	5.2616	1.010			1.91
	2	0.8049	14	765.703	770.902	5.199	46	55	56	55	56	55.5	5.00	3.7	5.2820	5.2616	0.996			1.91
	3	0.8049	14	770.902	776.104	5.202	46	56	56	56	56	56	5.00	3.7	5.2799	5.2616	0.997			1.91
																AVG =	1.001	0.66	1.05	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.994

AVERAGE $\Delta H_@$ = 1.83

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions
K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions
T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

DATE: 3/25/2021 **METER SERIAL #:** 2 **BAROMETRIC PRESSURE (in Hg):** INITIAL 29.2 FINAL 29.2 AVG (P_{bar}) 29.2

METER PART #: **CRITICAL ORIFICE SET SERIAL #:** JR

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y % Diff to Average Y	Y % Diff with other orifices	$\Delta H_@$
55	1	0.453	13	335.805	341.201	5.396	67	67	67	67	67	67	9.00	1.1	5.2918	5.1874	0.980			1.83
	2	0.453	13	341.201	346.359	5.158	67	67	68	67	68	67.5	9.00	1.1	5.0536	5.1874	1.026			1.82
	3	0.453	13	346.359	351.669	5.310	67	68	68	68	68	68	9.00	1.1	5.1975	5.1874	0.998			1.82
																AVG =	1.002	-0.02	0.33	
63	1	0.5788	10	351.669	357.312	5.643	67	68	68	68	68	68	7.50	1.8	5.5332	5.5233	0.998			1.83
	2	0.5788	10	357.312	362.975	5.663	67	68	68	68	68	68	7.50	1.8	5.5528	5.5233	0.995			1.83
	3	0.5788	10	362.975	368.602	5.627	67	68	69	68	69	68.5	7.50	1.8	5.5123	5.5233	1.002			1.83
																AVG =	0.998	-0.35	-0.33	
73	1	0.8049	14	368.602	373.712	5.110	67	69	69	69	69	69	5.00	3.7	5.0249	5.1206	1.019			1.95
	2	0.8049	14	373.712	378.917	5.205	67	69	69	69	69	69	5.00	3.7	5.1183	5.1206	1.000			1.95
	3	0.8049	14	378.917	384.144	5.227	67	69	70	69	70	69.5	5.00	3.7	5.1351	5.1206	0.997			1.95
																AVG =	1.006	0.37	0.73	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.002

AVERAGE $\Delta H_@$ = 1.87

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

Environics®

SERVICE REPORT

ATTN: David Kawasaki, Apex Companies, LLC

DATE OF SERVICE: 11/18/2020
SERIAL NUMBER: 6367

SERVICE TYPE: RECALIBRATION
NEXT CALIBRATION DUE: **11/19/2021**

CONDITIONS AS OBSERVED AND WORK PERFORMED:

- Unit powers up properly.
- Unit cleaned and Purged, data verified.
- All valves checked, ok.
- Checked for any software updates
- Voltages checked – 5v, -15v, +15v, 24v.
- Battery voltages checked.
- Unit leak tested.
- Tested all MFC's with each port.
- Zeros on each MFC checked.
- Spans checked on all MFCs.
- Incoming verification run on all MFCs.
- Verified all MFCs @ 5 standard points, passed within 1%
- All MFCs recalibrated
- All cables and screw/nuts tightened, ok.

Service Technician
11/18/2020

SERIES 4040

System S/N 6367

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

MFC # 1 Size: 10000 SCCM

MFC Serial Number: 0103486002

This flow controller was calibrated using a NIST-traceable Flow Standard. This calibration was performed with Nitrogen at a standard reference temperature and pressure of 32°F and 29.92 in. Hg. The Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	500	484.498
10%	1000	988.178
20%	2000	1997.523
30%	3000	3002.708
40%	4000	4013.548
50%	5000	5024.901
60%	6000	6039.875
70%	7000	7077.845
80%	8000	8108.056
90%	9000	9166.224
100%	10000	10239.148

All values in SCCM

Flow Verification Data

	Set Flow	True Flow
99%	9900	9921.544
85%	8500	8518.306
55%	5500	5517.054
25%	2500	2500.638
10%	1000	997.013

All values in SCCM

Verified by: *Terrie Lundmark* Date: *11-18-20*

Environics®

SERIES 4040

System S/N 6367

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

MFC # 2 Size: 10000 SCCM

MFC Serial Number: 0103486003

This flow controller was calibrated using a NIST-traceable Flow Standard. This calibration was performed with Nitrogen at a standard reference temperature and pressure of 32°F and 29.92 in. Hg. The Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	500	490.696
10%	1000	993.586
20%	2000	2004.661
30%	3000	3009.857
40%	4000	4018.185
50%	5000	5024.634
60%	6000	6040.024
70%	7000	7063.046
80%	8000	8085.829
90%	9000	9131.144
100%	10000	10177.882

All values in SCCM

Flow Verification Data

	Set Flow	True Flow
99%	9900	9926.599
85%	8500	8517.552
55%	5500	5514.260
25%	2500	2499.539
10%	1000	998.610

All values in SCCM

Verified by: Terri Lundmark Date: 11-18-20

SERIES 4040

System S/N 6367

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

MFC # 3 Size: 1000 SCCM

MFC Serial Number: 0101125002

This flow controller was calibrated using a NIST-traceable Flow Standard. This calibration was performed with Nitrogen at a standard reference temperature and pressure of 32°F and 29.92 in. Hg. The Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	50	47.818
10%	100	98.271
20%	200	199.839
30%	300	300.951
40%	400	402.462
50%	500	503.511
60%	600	604.776
70%	700	707.674
80%	800	811.628
90%	900	915.019
100%	1000	1019.838

Flow Verification Data

	Set Flow	True Flow
99%	990	989.008
85%	850	848.171
55%	550	549.887
25%	250	249.408
10%	100	99.851

All values in SCCM

Verified by: Terri Lundmark

Date: 11-18-20

Environics®

SERIES 4040

System S/N 6367

ENVIRONICS FLOW CONTROLLER CALIBRATION SHEET

MFC # 4 Size: 100 SCCM

MFC Serial Number: 0101127002

This flow controller was calibrated using a NIST-traceable Flow Standard. This calibration was performed with Nitrogen at a standard reference temperature and pressure of 32°F and 29.92 in. Hg. The Flow Calibration Data is not performance data. This data is used by the system operating mode to improve the flow accuracy. The Flow Verification Data is performance data.

Flow Calibration Data

	Set Flow	True Flow
5%	5	5.175
10%	10	10.624
20%	20	21.477
30%	30	32.248
40%	40	42.941
50%	50	53.560
60%	60	64.108
70%	70	74.538
80%	80	85.086
90%	90	95.717
100%	100	106.402

All values in SCCM

Flow Verification Data

	Set Flow	True Flow
99%	99	98.672
85%	85	84.767
55%	55	54.811
25%	25	24.893
10%	10	9.967

All values in SCCM

Verified by: Lori Lundmark Date: 11-18-20

Gas Mixing / Dilution / Calibration Systems
Environics Inc. • 69 Industrial Park Road East • Tolland, CT 06084 • (860) 872-1111 • Fax: (860) 870-9333
http://www.environics.com • info@environics.com

Z540.1

Certificate of Calibration

Everett Service Center

Certificate Number:	EVL670703		
Data Type:	Found-Left	**Calibration Date:**	18-Nov-2020
Result Summary:	In Tolerance	**Calibration Due:**	18-Nov-2021
Manufacturer:	Fluke	**Certificate Date:**	18-Nov-2020
Model:	51 II	**Temperature:**	22.3 °C
Serial Number:	85750131	**Humidity:**	37.8 %
Description:	Thermometer		
Procedure:	Fluke 51-II:(1 YEAR) ZCAL VER /5520	**Revision:**	1.2
Customer:	APEX COMPANIES		
City:	NOVI	**Country:**	US
State:	MI		
Purchase Order:	CCS KAWASAKI	**RMA:**	32077905

This calibration is traceable to the International System of Units (SI), through National Metrology Institutes (NIST, PTB, NRC, NPL, etc.), ratiometric techniques, or natural physical constants. This certificate applies only to the item identified and shall not be reproduced other than in full, without the specific written approval by Fluke Corporation. Calibration certificates without signature are not valid. The calibration has been completed in accordance with Fluke Electronics Corporation Quality System Document 111.0 Revision 124 and/or Fluke 17025 Quality Manual QSD 111.41 Revision 007.

The Data Type found in this certificate must be interpreted as:

- As - Found Calibration data collected before the unit is adjusted and / or repaired.
- As - Left Calibration data collected after the unit has been adjusted and / or repaired.
- Found-Left Calibration data collected without any adjustment and / or repair performed.

This calibration conforms to the requirements of ANSI/NCSL Z540-1-1994 (R2002).

In the attached measurement results, deviation may be expressed with units, Measured Value (MV) - Nominal Value (NV) or as a proportion of the nominal value ((MV-NV)/NV), expressed without units with a scalar multiplier such as % (0.01), or as a ratio of the units (mA/A, µV/V, etc.) Descriptions such as µA/A, µV/V, and others, where used to annotate results or column headings are the preferred replacements for what was historically labeled as "ppm" or parts-per-million and described the results in that column, unless otherwise noted by units symbols.

Where applicable, the expanded uncertainty of measurement at the time of test is given in the following pages. They are calculated in accordance with the method described in the ISO Guide to the Expression of Uncertainty in Measurement (GUM). The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k, such that the confidence level approximates 95%.

Where applicable, the Test Uncertainty Ratio (TUR) is provided in the following pages. Unless otherwise stated, the TUR for a given measurement result is 4:1 or greater.

Results are reviewed to establish where any measurement results exceeded the manufacturer's specifications.

Measurement results greater than limits of error are indicated by '!'.

ROBERT LEVER
Issued By

Standards Used

Asset	Description	Cal-Date	Cal-Due
12177	Fluke 5520A Calibrator	17-Jul-2020	17-Apr-2021

Calibration Data

Parameter	Nominal Value	Measurement Result	Limits of Error Lower Limit	Limits of Error Upper Limit	Test Uncertainty Ratio (TUR)
FUNCTIONAL TESTS:					
Display Test		Pass			
Keypad Test		Pass			
Thermocouple - Type K					
DEGREES CELSIUS VERIFICATION					
0.0 °C	0.00	0.0	-0.3	0.3	1.88
20.0 °C	20.00	20.0	19.7	20.3	1.94
-190.0 °C	-190.00	-189.7	-190.7	-189.3	2.06
990.0 °C	990.00	989.4	989.2	990.8	3.06
DEGREES FAHRENHEIT VERIFICATION					
32.0 °F	32.00	32.0	31.4	32.6	1.93
73.4 °F	73.40	73.4	72.8	74.0	2.00
-310.0 °F	-310.00	-309.5	-311.2	-308.8	1.95
2192 °F	2192.0	2191	2190	2194	2.27

APEX

Nozzle Verification

Facility	Aravco	Consultant	DMK
Source		Date	3/1/21

Nozzle ID	D_1 (inch)	D_2 (inch)	D_3 (inch)	ΔD (inch)	$D_{average}$ (inch)
RTD	0.245	0.244	0.246	0.002	0.245
~~BH11~~	~~0.170~~	~~0.171~~	~~0.174~~	~~0.004~~	~~0.172~~
BH11	0.180	0.179	0.180	0.001	0.180
BH13	0.180	0.179	0.180	0.001	0.180
Press	0.180	0.179	0.180	0.001	0.180

Nozzle diameter measured on a different diameter (inches)
Tolerance: measure within 0.001 inches.

ΔD = Maximum difference in any two measurements (inches)
Tolerance = 0.004 inches.
$D_{average}$ = Average of D_1, D_2, D_3.

APEX COMPANIES, LLC
PITOT TUBE INSPECTION

APEX

PITOT TUBE NO. 45

DATE 3/2/21

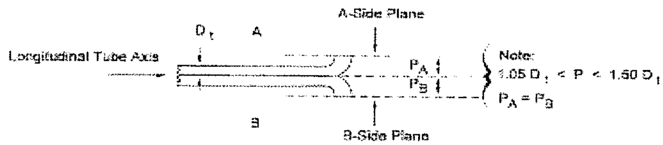
Pitot Tube not on Probe

Operator: DMC

$3/16 \leq Dt \leq 3/8$ — YES NO

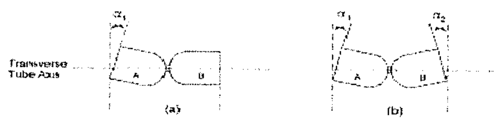
0.48 cm 0.95 cm

$P_A = P_B$ — YES NO

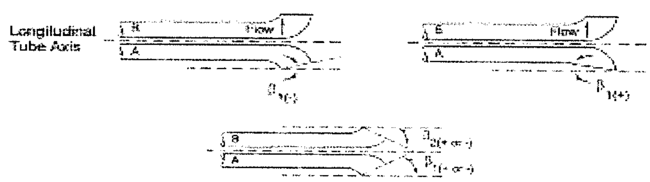


$1.05\ Dt \leq P_{A,B} \leq 1.5\ Dt$ — YES NO

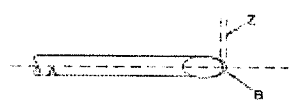
α_1 and $\alpha_2 < 10°$ — α YES NO



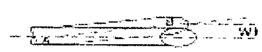
β_1 and $\beta_2 < 5°$ — β YES NO



z < 0.32 cm (1/8 in) — z YES NO



w < 0.08 cm (1/32 in) — w YES NO



Pitot on Probe
Component Spacing OK

Pitot Tube Correction Factor: 0.84

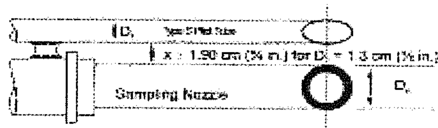


Fig. A

Fig.

A. $x \geq 1.9$ cm — A. **YES** (circled) NO

B-1. $z \geq 1.9$ cm
$w \geq 7.62$ cm — B-1. **YES** (circled) NO

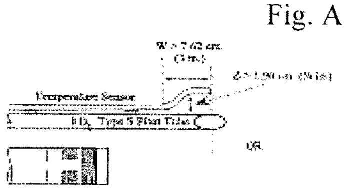


Fig. B-1

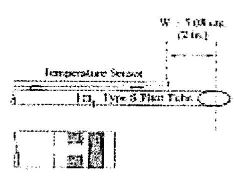


Fig. B-2

or

B-2. $z \geq 5.08$ cm — B-2. **YES** (circled) NO

C. $Y \geq 7.62$ cm — C. **YES** (circled) NO

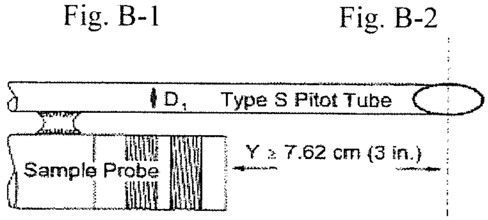


Fig. C

APEX COMPANIES, LLC
PITOT TUBE INSPECTION

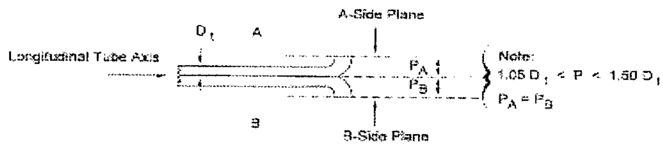
PITOT TUBE NO. 30

DATE 3/3/21

Pitot Tube not on Probe

Operator: DMc

$3/16 \leq D_t \leq 3/8$
0.48 cm 0.95 cm
$P_A = P_B$

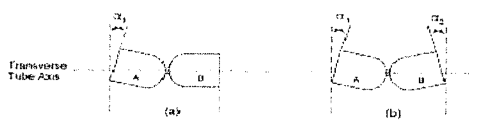


YES NO

YES NO

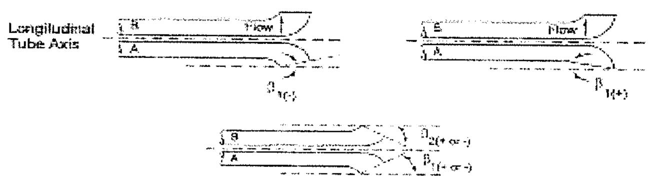
$1.05\ D_t \leq P_{A,B} \leq 1.5\ D_t$ YES NO

α_1 and $\alpha_2 < 10°$



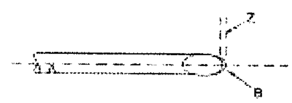
α YES NO

β_1 and $\beta_2 < 5°$



β YES NO

$z < 0.32$ cm (1/8 in)



z YES NO

$w < 0.08$ cm (1/32 in)

w YES NO

Pitot on Probe
Component Spacing OK

Pitot Tube Correction Factor: 0.84

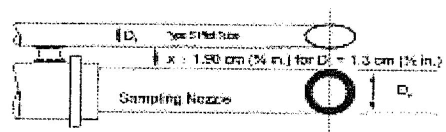
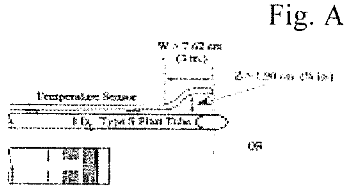


Fig. A

Fig.

A. $x \geq 1.9$ cm — A YES NO

B-1. $z \geq 1.9$ cm
$w \geq 7.62$ cm — B-1 YES NO



or

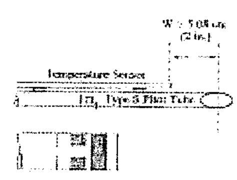


Fig. B-1 Fig. B-2

or

B-2. $z \geq 5.08$ cm — B-2. YES NO

C. $Y \geq 7.62$ cm — C. YES NO

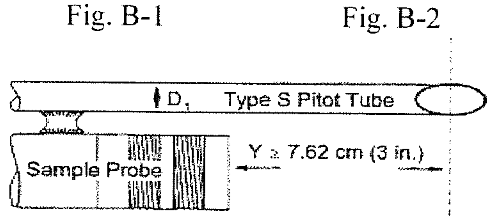


Fig. C

APEX COMPANIES, LLC
PITOT TUBE INSPECTION

PITOT TUBE NO. 5f1 A

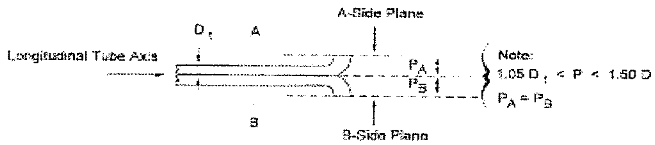
DATE 3/4/21

Pitot Tube not on Probe

Operator: DMK

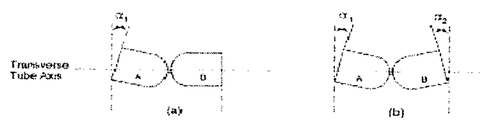
$3/16 \le D_t \le 3/8$
0.48 cm 0.95 cm — YES NO

$P_A = P_B$ — YES NO



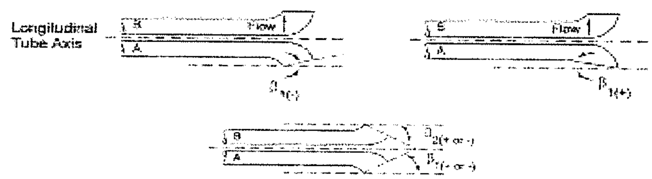
$1.05\ D_t \le P_{A,B} \le 1.5\ D_t$ — YES NO

α_1 and $\alpha_2 < 10°$



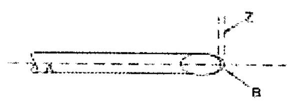
α YES NO

β_1 and $\beta_2 < 5°$

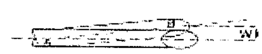


β YES NO

z < 0.32 cm (1/8 in) — z YES NO



w < 0.08 cm (1/32 in) — w YES NO



Pitot on Probe
Component Spacing OK

Pitot Tube Correction Factor: 0.84

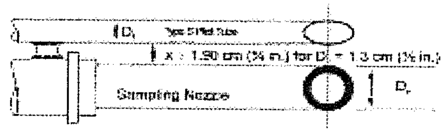
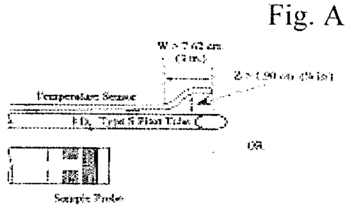


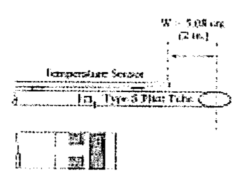
Fig. A

Fig.

A. $x \ge 1.9$ cm — A. **YES** (circled) NO

B-1. $z \ge 1.9$ cm
$w \ge 7.62$ cm — B-1. **YES** (circled) NO





or

Fig. B-1 Fig. B-2

B-2. $z \ge 5.08$ cm — B-2. **YES** (circled) NO

C. $Y \ge 7.62$ cm — C. **YES** (circled) NO

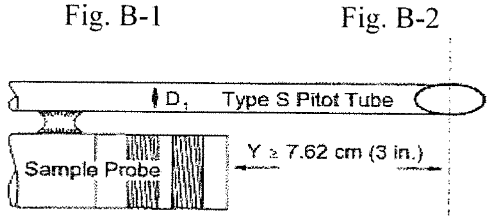


Fig. C

APEX COMPANIES, LLC
PITOT TUBE INSPECTION

APEX

PITOT TUBE NO. 46

DATE 3/5/21

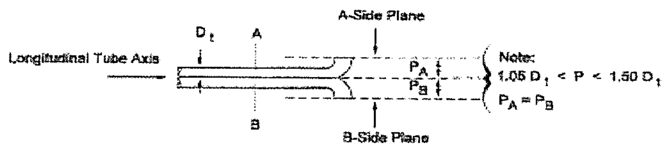
Pitot Tube not on Probe

Operator: DMC

$3/16 \le Dt \le 3/8$ YES NO

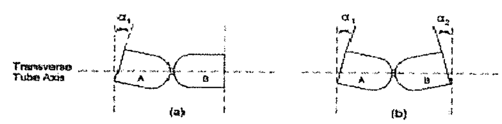
0.48 cm 0.95 cm

$P_A = P_B$ YES NO



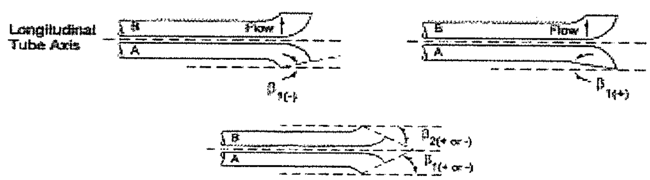
$1.05\ Dt \le P_{A,B} \le 1.5\ Dt$ YES NO

α_1 and $\alpha_2 < 10°$



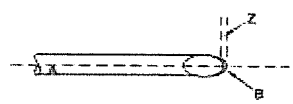
α YES NO

β_1 and $\beta_2 < 5°$

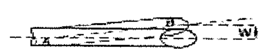


β YES NO

z < 0.32 cm (1/8 in) z YES NO



w < 0.08 cm (1/32 in) w YES NO



Pitot on Probe

Component Spacing OK

Pitot Tube Correction Factor: 0.84

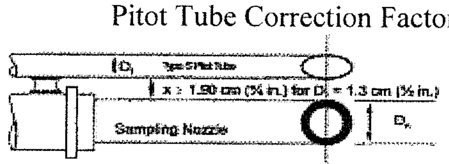


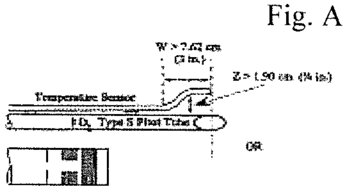
Fig. A

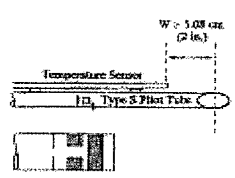
Fig.

A. $x \ge 1.9$ cm A. YES NO

B-1. $z \ge 1.9$ cm B-1. YES NO

$w \ge 7.62$ cm





or

Fig. B-1 Fig. B-2

B-2. $z \ge 5.08$ cm B-2. YES NO

C. $Y \ge 7.62$ cm C. YES NO

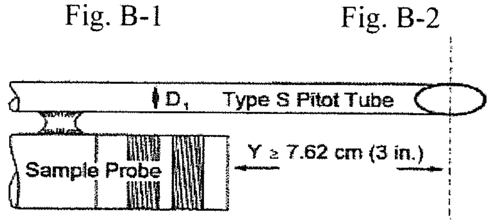


Fig. C

Practical Instrument Electronics
82 East Main Street Suite 3.14 • Webster NY 14580 USA
Tel (585) 872-9350 • Fax (585) 872-2638 • www.piecal.com

CERTIFICATE OF CALIBRATION

This is to certify that your instrument has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (formerly NBS) within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Practical Instrument Electronics
Recommended Recalibration: Annually

Model Number 520 Serial No. 107222 Calibration Technician Ken Gartley

Calibration Date 11/23/2020 In Service Date ______ Calibration Due 11/23/2021

Function Parameter Tested	Low Limit	As Received	High Limit	Adjusted
SOURCE				
80.000 mV	79.979 mV	79.999	80.021 mV	80.000
40.000 mV	39.985 mV	39.998	40.015 mV	40.000
0.000 mV	-0.009 mV	0.003	0.009 mV	0.000
-13.000 mV	-13.011 mV	-12.998	-12.989 mV	-12.999
COLD JUNCTION		23.76		24.92
ISOTHERMAL BLOCK TEMP		23.89		24.94
COLD JUNCTION READING	BLOCK TEMP 0.25°C	0.13	BLOCK TEMP 0.25°C	0.02

Assets	Serial Number	Last Cal'd	Cal Due
Datron 1271	26608-8	9/24/2019	9/24/2021
USS103JL7P	138998-003	3/13/2017	2/2/2022

PN:005-0306 Rev:A

AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

Customer ID: 022824 S/N: M10640
Customer: APEX City: NOVI State: MI
As-Received Model #: ADM-880C Converted to Model #: Order #: R201943
PO #: Customer Eqpt ID#: Calibration Due Date:

This instrument has been calibrated using Calibration Standards which are traceable to NIST (National Institute of Standards and Technology). Test accuracy ratio is 4:1 for pressures and temperature. Quality Assurance Program and calibration procedures meet the requirements for ANSI/NCSL Z540-1, ISO 17025, MIL-STD 45662A and manufacturer's specifications. Calibration accuracy is certified when meters are used with properly functioning accessories only. All Uncertainties are expressed in expanded terms (twice the calculated uncertainty). This report shall not be reproduced, except in full, without the written approval of Shortridge Instruments, Inc. Results relate only to the item calibrated. For limitations on use, see Shortridge Instruments, Inc. Instruction Manual for the use of AirData Multimeters. Procedure used: Procedure for Differential Pressure, Absolute Pressure and Temperature Recalibration of AirData Multimeters SIP-CP02 Revision: 30 Dated: 04/04/16

Calibration Technician(s): M. Diddens M. Ramirez Calibration Date: 07/21/2020
Calibration Approved by: J. Faulkner Title: Cal Mg Date: 07/24/2020

AS-Received	Final Test	Test
By M.D.	By MR	By
Date 07-16-2020 Rh 48 %	Date 07/21/2020 Rh 50 %	Date Rh %
Ambient Temperature 76 °F	Ambient Temperature 77 °F	Ambient Temperature N/A °F
Barometric Pressure 28.36 in Hg	Barometric Pressure 28.32 in Hg	Barometric Pressure in Hg
All within spec (YES) NO NA	All within spec (YES) NO	All within spec YES NO

ABSOLUTE PRESSURE TEST (in Hg)

TEST METER TOLERANCE = ± 2.0 % ± .1 in Hg AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

Pressure Standard: Heise #02-R S/N: 41741/42451 As-Rcvd (Test 2) Test 3
Pressure Standard: Heise #04-R S/N: 41743/42453 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #06-R S/N: 41742/42452-1 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #08-R S/N: 42186/43328 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #10-R S/N: 42203/43352 (As-Rcvd) Test 2 Test 3
Pressure Standard: Heise #12A-R S/N: 45605/48491 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #14-R S/N: 43412/45043-2 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #16-R S/N: 43413/45044 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #18-R S/N: 44581/46845 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #20-R S/N: 44582/46847 As-Rcvd Test 2 Test 3

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
14.0	14.16	14.1	-.42	14.04	14.0	-.28			
28.4	28.36	28.4	.14	28.32	28.3	-.07		N/A	
40.0	40.14	40.2	.15	40.02	40.0	-.05			

DIFFERENTIAL PRESSURE TEST (in wc)

TEST METER TOLERANCE = ± 2.0 % ± 0.001 in wc AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

Pressure Standard: Heise #01-L S/N: 41739/42449 As-Rcvd (Test 2) Test 3
Pressure Standard: Heise #01-R S/N: 41739/42446 As-Rcvd (Test 2) Test 3
Pressure Standard: Heise #02-L S/N: 41741/42454 As-Rcvd (Test 2) Test 3
Pressure Standard: Heise #03A-L S/N: 45570/48461 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #03A-R S/N: 45570/48460 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #04-L S/N: 41743/42456 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #05-L S/N: 41740/42450 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #05-R S/N: 41740/42447 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #06-L S/N: 41742/42455 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #07-L S/N: 42185/42186 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #07-R S/N: 42185/43326 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #08-L S/N: 42186/43329 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #09-L S/N: 42202/43351 (As-Rcvd) Test 2 Test 3
Pressure Standard: Heise #09-R S/N: 42202/43350 (As-Rcvd) Test 2 Test 3
Pressure Standard: Heise #10-L S/N: 42203/43353 (As-Rcvd) Test 2 Test 3
Pressure Standard: Heise #11-L S/N: 43165/44551-1 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #11-R S/N: 43165/44730 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #12A-L S/N: 45605/48490 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #13-L S/N: 43415/45041 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #13-R S/N: 43415/45039 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #14-L S/N: 43412/45045 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #15-L S/N: 43416/45042 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #15-R S/N: 43416/45040 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #16-L S/N: 43413/45046 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #17-L S/N: 44579/46842 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #17-R S/N: 44579/46841 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #18-L S/N: 44581/46846 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #19-L S/N: 44580/46844 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #19-R S/N: 44580/46843 As-Rcvd Test 2 Test 3
Pressure Standard: Heise #20-L S/N: 44582/46848 As-Rcvd Test 2 Test 3

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
.0500	.0525	.0524	-.19	.0501	.0500	-.20			
.1250	.1254	.1253	-.08	.1264	.1262	-.16			
.2250	.2256	.2253	-.13	.2259	.2258	-.04			
1.000	1.026	1.027	.10	1.037	1.035	-.19			
2.000	2.027	2.028	.05	2.058	2.055	-.15		N/A	
3.600	3.611	3.607	-.11	3.642	3.632	-.27			
4.400	4.413	4.423	.23	4.419	4.424	.11			
27.00	27.07	27.24	.63	27.05	27.17	.44			
50.00	50.01	50.14	.26	50.12	50.11	-.02			
Overange	NA	✓	NA	NA	✓	NA	NA		NA

Shortridge Instruments, Inc.
7855 East Redfield Road Scottsdale, Arizona 85260
(480) 991-6744 • Fax (480) 443-1267 • www.shortridge.com

AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

S/N: M10640

Order #: R201943

LOW VELOCITY CONFIRMATION (FPM)

TEST METER TOLERANCE = ± 3.0% ± 7 FPM   AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

Vel Eqv Trans Std: S/N: M02009	(As-Rcvd)	Test 2	Test 3	Vel Eqv Trans Std: S/N: M10897	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M02903	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M10901	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M10839	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M13492	As-Rcvd	Test 2	Test 3
Vel Eqv Trans Std: S/N: M10840	As-Rcvd	Test 2	Test 3	Vel Eqv Trans Std: S/N: M19325	As-Rcvd	(Test 2)	Test 3

Approx Set Point	Standard	Test Meter	Diff	Standard	Test Meter	Diff	Standard	Test Meter	Diff
100	101.7	100	-1.7	104	105	1		N/A	
500	530.2	529	-1.2	503	503	0			

ADM-880C, ADM-870/870C and ADM-860/860C models are read in AirFoil Mode. ADM-850/850L models are read in Pitot Tube Mode.

TEMPERATURE TEST - AIRDATA MULTIMETER (° F)

TEST METER TOLERANCE = ± 0.2° F   AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A See Notes

RTD Simulator: S/N 249	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 250	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 253	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 254	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 256	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 257	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 292	As-Rcvd	(Test 2)	Test 3	Set Point: (35.6° F)	95° F	154.4° F
RTD Simulator: S/N 293	As-Rcvd	(Test 2)	Test 3	Set Point: 35.6° F	(95° F)	154.4° F
RTD Simulator: S/N 294	As-Rcvd	(Test 2)	Test 3	Set Point: 35.6° F	95° F	(154.4° F)
RTD Simulator: S/N 313	(As-Rcvd)	Test 2	Test 3	Set Point: (35.6° F)	95° F	154.4° F
RTD Simulator: S/N 314	(As-Rcvd)	Test 2	Test 3	Set Point: 35.6° F	(95° F)	154.4° F
RTD Simulator: S/N 315	(As-Rcvd)	Test 2	Test 3	Set Point: 35.6° F	95° F	(154.4° F)
RTD Simulator: S/N 316	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 317	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 318	As-Rcvd	Test 2	Test 3	Set Point: 35.6° F	95° F	154.4° F

RTD Simulator Temperature Equivalent Set Point	Test Meter	Difference	Test Meter	Difference	Test Meter	Difference
35.60	35.6	0	35.7	.1		N/A
95.00	95.0	0	95.0	0		
154.40	154.4	0	154.4	0		

NOTES:

The enclosed ADM Calibration Standards for Pressure and Temperature form(s) is/are an integral part of this calibration and must remain with this Certificate of Calibration. Note: There may be more than one such form included that pertains to this calibration.

Shortridge Instruments, Inc.
7855 East Redfield Road Scottsdale, Arizona 85260
(480) 991-6744 • Fax (480) 443-1267 • www.shortridge.com

Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Order Number: R201943 Serial Number: M10640 Test Type: Initial (As-Received) (Final)

ABSOLUTE PRESSURE STANDARDS

ADM #02-R	S/N: 41741/42451	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 04/27/20	Due Date: 04/2021
ADM #04-R	S/N: 41743/42453	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 11/07/19	Due Date: 11/2020
ADM #06-R	S/N: 41742/42452-1	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 08/21/19	Due Date: 08/2020
ADM #08-R	S/N: 42186/43328	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/13/20	Due Date: 03/2021
ADM #10-R	S/N: 42203/43352	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 01/13/20	Due Date: 01/2021
ADM #12A-R	S/N: 45605/48491	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 07/16/19	Due Date: 07/2020
ADM #14-R	S/N: 43412/45043-2	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 10/07/19	Due Date: 09/2020
ADM #16-R	S/N: 43413/45044	Heise Model: PPM-2	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 02/27/20	Due Date: 02/2021
ADM #18-R	S/N: 44581/46845	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 05/20/20	Due Date: 05/2021
ADM #20-R	S/N: 44582/46847	Heise Model: PPM-2	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 06/20/19	Due Date: 06/2020

#02-R, 04-R, 06-R, 08-R, 10-R, 12A-R, 14-R, 16-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-30 psia	Resolution: 0.01	Uncertainty: < 0.0358
#18-R, 20-R	Rated Accuracy: 0.05% fs (0.0305 in Hg)	Range: 0-60 in Hg	Resolution: 0.001	Uncertainty: < 0.0358

DIFFERENTIAL PRESSURE STANDARDS

ADM #01-L	S/N: 41739/42449	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 05/05/20	Due Date: 04/2021
ADM #01-R	S/N: 41739/42446	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 05/05/20	Due Date: 04/2021
ADM #02-L	S/N: 41741/42454	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 05/04/20	Due Date: 04/2021
ADM #03A-L	S/N: 45570/48461	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 11/11/19	Due Date: 11/2020
ADM #03A-R	S/N: 45570/48460	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 11/11/19	Due Date: 11/2020
ADM #04-L	S/N: 41743/42456	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 11/08/19	Due Date: 11/2020
ADM #05-L	S/N: 41740/42450	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 08/26/19	Due Date: 08/2020
ADM #05-R	S/N: 41740/42447	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 08/28/19	Due Date: 08/2020
ADM #06-L	S/N: 41742/42455	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 08/26/19	Due Date: 08/2020
ADM #07-L	S/N: 42185/42186	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/13/20	Due Date: 03/2021
ADM #07-R	S/N: 42185/43326	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/11/20	Due Date: 03/2021
ADM #08-L	S/N: 42186/43329	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/13/20	Due Date: 03/2021
ADM #09-L	S/N: 42202/43351	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 01/30/20	Due Date: 01/2021
ADM #09-R	S/N: 42202/43350	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 01/30/20	Due Date: 01/2021
ADM #10-L	S/N: 42203/43353	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 01/30/20	Due Date: 01/2021
ADM #11-L	S/N: 43165/44551-1	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 07/15/19	Due Date: 07/2020
ADM #11-R	S/N: 43165/44730	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 07/15/19	Due Date: 07/2020
ADM #12A-L	S/N: 45605/48490	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 07/16/19	Due Date: 07/2020
ADM #13-L	S/N: 43415/45041	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #13-R	S/N: 43415/45039	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #14-L	S/N: 43412/45045	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 09/19/19	Due Date: 09/2020
ADM #15-L	S/N: 43416/45042	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/03/20	Due Date: 02/2021
ADM #15-R	S/N: 43416/45040	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/03/20	Due Date: 02/2021
ADM #16-L	S/N: 43413/45046	Heise Model: PPM-1	Mfgd by Dresser Industries Calibrated by Ashcroft	Calibration Date: 03/03/20	Due Date: 02/2021
ADM #17-L	S/N: 44579/46842	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 05/27/20	Due Date: 05/2021
ADM #17-R	S/N: 44579/46841	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 05/27/20	Due Date: 05/2021
ADM #18-L	S/N: 44581/46846	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 05/27/20	Due Date: 05/2021
ADM #19-L	S/N: 44580/46844	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 07/15/19	Due Date: 06/2020
ADM #19-R	S/N: 44580/46843	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 07/15/19	Due Date: 06/2020
ADM #20-L	S/N: 44582/46848	Heise Model: PPM-1	Mfgd & Calibrated by Ashcroft, Inc.	Calibration Date: 06/18/19	Due Date: 06/2020

#01-L, 03A-L, 05-L, 07-L, 09-L, 11-L, 13-L, 15-L, 17-L, 19-L	Rated Accuracy: > 0.07% fs (0.000175 in wc)	Range: 0.0-0.25 in wc	Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03A-R, 05-R, 07-R, 09-R, 11-R, 13-R, 15-R, 17-R, 19-R	Rated Accuracy: > 0.06% fs (0.003 in wc)	Range: 0.0-5.0 in wc	Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12A-L, 14-L, 16-L, 18-L, 20-L	Rated Accuracy: > 0.06% fs (0.03 in wc)	Range: 0.0-50.0 in wc	Res.: 0.001	Uncertainty: < 0.0346

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Shortridge Instruments, Inc. AirData Multimeter Calibration Equipment

Customer Order Number, Meter Serial Number, and Test Type are referenced on page 1

LOW VELOCITY EQUIVALENT CONFIRMATION STANDARDS

Vel Eqv Transfer Standard S/N: M02009	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M02903	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M10839	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M10840	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M10897	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 01/17/20	Due Date: 01/2021
Vel Eqv Transfer Standard S/N: M10901	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, inc.	Calibration Date: 12/10/19	Due Date: 12/2020
Vel Eqv Transfer Standard S/N: M13492	Model ADM-870C	Mfg'd & Calibrated by Shortridge Instruments, inc.	Calibration Date: 08/08/19	Due Date: 08/2020
Vel Eqv Transfer Standard S/N: M19325	Model ADM-870C	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 06/25/20	Due Date: 06/2021

Rated Accuracy: Velocity ± 1.5 % ± 3.5 fpm   Range: 100-5000 fpm   Resolution: 0.1   Uncertainty: <5.00 fpm at 100 fpm; <7.50 fpm at 500 fpm

TEMPERATURE STANDARDS

RTD Simulator S/N: 249	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 250	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 253	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/02/20	Due Date: 03/2024
RTD Simulator S/N: 254	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 256	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 257	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 05/04/20	Due Date: 04/2024
RTD Simulator S/N: 292	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 293	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 294	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 01/03/20	Due Date: 01/2024
RTD Simulator S/N: 313	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 314	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 315	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 03/16/18	Due Date: 03/2022
RTD Simulator S/N: 316	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
RTD Simulator S/N: 317	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022
RTD Simulator S/N: 318	Model RTD-1000/500	Mfgd by General Resistance	Calibrated by IET Labs	Calibration Date: 04/16/18	Due Date: 04/2022

Rated Accuracy: 0.025% of setting   Range: 100.00 Ω to 11111.10 Ω   Resolution: 0.01 Ω   Uncertainty: ≤ 32 ppm

Thermometer #1 S/N 8A089/Thermistor S/N A410660	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 08/27/19	Due Date: 08/2021
Thermometer #2 S/N 8B104/Thermistor S/N 871507	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 11/07/18	Due Date: 10/2020
Thermometer #5 S/N B11780/Thermistor S/N B10505	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 03/07/19	Due Date: 03/2021
Thermometer #6 S/N B11782/Thermistor S/N B10509	Model 1504/5610	Mfgd by Hart Scientific	Calibrated by Fluke	Calibration Date: 02/24/20	Due Date: 02/2022
Thermometer #7 S/N B49938/Thermistor S/N B482202	Model 1504/5610	Mfgd and Calibrated by Fluke		Calibration Date: 09/26/19	Due Date: 09/2021

Rated Accuracy(combined): 0.0324° F   Range: 32° F to 176° F   Resolution: 0.001° F   Combined Uncertainty with Baths: ≤ 0.040° F

Temp Transfer Standard S/N M00136	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 10/02/19	Due Date: 10/2020
Temp Transfer Standard S/N M96100	Model ADM-870	Mfgd & Calibrated by Shortridge Instruments, Inc.	Calibration Date: 03/09/20	Due Date: 03/2021

Rated Accuracy: 0.03° F   Range: 33° F to 158° F   Resolution: 0.01° F   Uncertainty: < 0.023° F

Total combined Uncertainty for MultiTemp and TemProbe testing : ≤ 0.046° F

This form must remain with the Certificate of Calibration corresponding to the Customer Order Number and Meter Serial Number referenced on page 1.

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Stratification Test

Source	RTO
Duct Diameter (inches)	123
Stratification Check Analyte	NOx

*stratification not required for ducts less than 4 inches in diameter
Sample for minimum of twice the response time

Initial Three-Point Stratification

Point	Distance From Stack Wall (inches)	Average Concentration (ppmv)	Average Concentration from Mean (ppmv)	Average Concentration from Mean (%)
3	20.5	71.6	1.2	1.6
2	61.5	72.8	0.0	0.0
1	102.5	74.0	1.2	1.6
	Mean	72.8		

Required Number of Sampling Points (least restrictive)	Method 1	1

Sample Point Criteria
If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±5.0% of the mean concentration OR ±0.5 ppmv, then unstratified; 1 sample point

If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±10.0% of the mean concentration OR ±1.0 ppmv, then minimally stratified; 3 sample points

If concentration at each traverse point differs from the mean concentration for all traverse points by greater than ±10.0% of the mean concentration OR ±1.0 ppmv, then stratified; Method 1 sample points

NOx Calibration Gas Selection

Span Value (ppmv) 450.0 NOx

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (span value, ppmv)	N/A	450.0	N/A	Yes
Mid-Level Concentratoin Gas (40-60% of span value, ppmv)	180.0	225.0	270.0	Yes
Zero-Level Concentration Gas (<20% of span value, ppmv)	0.0	0.0	90.0	Yes

CO Calibration Gas Selection

Span Value (ppmv) 200.0 CO

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (span value, ppmv)	N/A	200.0	N/A	Yes
Mid-Level Concentratoin Gas (40-60% of span value, ppmv)	80.0	100.0	120.0	Yes
Zero-Level Concentration Gas (<20% of span value, ppmv)	0.0	0.0	40.0	Yes

VOC Calibration Gas Selection

Span Value (ppmv) 50.0 VOC

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (80-90% of span value, ppmv)	40.0	42.5	45.0	Yes
Mid-Level Concentratoin Gas (45-55% of span value, ppmv)	22.5	25.0	27.5	Yes
Low-Level Concentration Gas (25-35% of span value, ppmv)	12.5	15.0	17.5	Yes
Zero-Level Concentration Gas (0% of span value, ppmv)	0.0	0.0	0.1	Yes

APEX

NOx Calibration, Bias, and Drift Data

Source	RTO	Calibration Span	450
Operator	DMK	Response Time (s)	30
Date	March 2, 2021	Serial No.	1218153462
Analyzer	Thermo Sci 42i-HL		

	Manufacturer's Certified Cylinder Value (ppmv)	Analyzer Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of Calibration Span)	Pass/Fail *
	A	B	A-B	(A-B)/CS * 100	
Low-level (or zero) calibration gas	0.0	0.0	0.0	0.0	Pass
Mid-level calibration gas	225.0	224.5	0.5	0.1	Pass
High-level calibration gas	450.0	449.5	0.5	0.1	Pass

*Calibration error must be ±2%

Run 1

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	0.0	0.4	0.1	Pass	1.2	0.3	Pass	0.2	Pass
Upscale (mid) level	225.0	224.5	224.2	-0.1	Pass	216.6	-1.8	Pass	1.7	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 2

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	0.0	1.2	0.3	Pass	0.5	0.1	Pass	0.2	Pass
Upscale (mid) level	225.0	224.5	216.6	-1.8	Pass	219.3	-1.2	Pass	0.6	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 3

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	0.0	0.5	0.1	Pass	0.8	0.2	Pass	0.1	Pass
Upscale (mid) level	225.0	224.5	219.3	-1.2	Pass	218.8	-1.3	Pass	0.1	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

APEX

NO_2-NO Conversion Efficiency

Client	Arauco	Analyzer Model No.	Thermo Sci 42i-HL
Operator	DMK	Serial No.	1218153462
Date	March 1, 2021	Calibration Span	500

Certified Calibration Gas Value (ppmv)	Analyzer Response Peak Value (ppmv)	NO_2 to NO converter Efficiency (%)	Efficiency: Pass/Fail
50.99	46.5	91.2	Pass

CO Calibration, Bias, and Drift Data

Source	RTO	Calibration Span	500
Operator	DMK	Response Time (s)	30
Date	March 2, 2021	Serial No.	312
Analyzer	Teledyne 300EM		

	Manufacturer's Certified Cylinder Value (ppmv)	Analyzer Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of Calibration Span)	Pass/Fail *
	A	B	A-B	(A-B)/CS * 100	
Low-level (or zero) calibration gas	0.0	-3.3	3.3	0.7	Pass
Mid-level calibration gas	100.0	99.4	0.6	0.1	Pass
High-level calibration gas	200.0	200.7	-0.7	-0.1	Pass

*Calibration error must be ±2%

Run 1

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	-3.3	0.0	0.7	Pass	2.0	1.1	Pass	0.4	Pass
Upscale (mid) level	100.0	99.4	102.4	0.6	Pass	103.7	0.9	Pass	0.3	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 2

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	-3.3	2.0	1.1	Pass	1.5	1.0	Pass	0.1	Pass
Upscale (mid) level	100.0	99.4	103.7	0.9	Pass	101.3	0.4	Pass	0.5	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 3

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	-3.3	1.5	1.0	Pass	-2.9	0.1	Pass	0.9	Pass
Upscale (mid) level	100.0	99.4	101.3	0.4	Pass	101.6	0.4	Pass	0.1	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

APEX

VOC Calibration and Drift Data

Source: RTO
Analyzer: JUM 3-300A

Operator: DMK
Date: 3/2/2021

Calibration Error Data

Response Time: 30

Span: 50

Gas Range	Cylinder Value (ppmv)	Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of calibration)	Pass/Fail
Zero gas	0.0	-0.1	0.1	0.2	Pass
Low-range gas	15.0	15.1	0.1	0.7	Pass
Mid-range gas	25.0	25.0	0.0	0.0	Pass
High-range gas	42.5	42.7	0.2	0.5	Pass

Calibration Drift Data

Run 1

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	-0.1	0.1	0.2	0.4	Pass
Low-range gas	15.1	14.9	0.7	0.4	Pass

Run 2

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.1	0.6	1.2	1.0	Pass
Low-range gas	14.9	15.1	0.7	0.4	Pass

Run 3

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.6	0.0	0.0	1.2	Pass
Low-range gas	15.1	15.0	0.0	0.2	Pass

USEPA Method 205 Gas Dilution Field Calibration

Analyte NOx
High-Level Supply Gas 500.4 ppmv

Expected Concentration (ppmv)	Acceptable Range[1] (ppmv) Low	High	Actual Concentration 1 (ppmv)	Actual Concentration 2 (ppmv)	Actual Concentration 3 (ppmv)	Acceptable Yes/No
225.0	220.5	229.5	225.1	225.3	225.5	Yes
100.0	98.0	102.0	100.6	100.3	100.7	Yes

Mid-Level Supply Gas 100.6 ppmv

Expected Concentration (ppmv)	Acceptable Range[1] (ppmv) Low	High	Actual Concentration 1 (ppmv)	Actual Concentration 2 (ppmv)	Actual Concentration 3 (ppmv)	Acceptable Yes/No
100.6	98.6	102.6	101.6	101.9	101.5	Yes

1: acceptable range is ±2% of the expected concentration

Stratification Test

Source	BH11
Duct Diameter (inches)	49.25
Stratification Check Analyte	VOC

*stratification not required for ducts less than 4 inches in diameter
Sample for minimum of twice the response time

Initial Three-Point Stratification

Point	Distance From Stack Wall (inches)	Average Concentration (ppmv)	Average Concentration from Mean (ppmv)	Average Concentration from Mean (%)
3	8.2	12.6	0.1	0.8
2	24.6	12.5	0.0	0.0
1	41.0	12.4	0.1	0.8
	Mean	12.5		
Required Number of Sampling Points (least restrictive)			1	1

Sample Point Criteria
If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±5.0% of the mean concentration OR ±0.5 ppmv, then unstratified; 1 sample point

If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±10.0% of the mean concentration OR ±1.0 ppmv, then minimally stratified; 3 sample points

If concentration at each traverse point differs from the mean concentration for all traverse points by greater than ±10.0% of the mean concentration OR ±1.0 ppmv, then stratified; Method 1 sample points

APEX

VOC Calibration Gas Selection

Span Value (ppmv) 50.0 VOC

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (80-90% of span value, ppmv)	40.0	42.5	45.0	Yes
Mid-Level Concentratoin Gas (45-55% of span value, ppmv)	22.5	25.0	27.5	Yes
Low-Level Concentration Gas (25-35% of span value, ppmv)	12.5	15.0	17.5	Yes
Zero-Level Concentration Gas (0% of span value, ppmv)	0.0	0.0	0.1	Yes

APEX

VOC Calibration and Drift Data

Source: BH11 Operator: DMK
Analyzer: JUM 3-300A Date: 3/3/2021

Calibration Error Data

Response Time: 50 Span: 50

Gas Range	Cylinder Value (ppmv)	Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of calibration)	Pass/Fail
Zero gas	0.0	0.1	0.1	0.2	Pass
Low-range gas	15.0	15.1	0.1	0.7	Pass
Mid-range gas	25.0	25.1	0.1	0.4	Pass
High-range gas	42.5	42.5	0.0	0.0	Pass

Calibration Drift Data

Run 1

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.1	-0.2	-0.4	0.6	Pass
Low-range gas	15.1	14.9	0.7	0.4	Pass

Run 2

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	-0.2	-0.1	-0.2	0.2	Pass
Low-range gas	14.9	15.1	0.7	0.4	Pass

Run 3

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	-0.1	-0.1	-0.2	0.0	Pass
Low-range gas	15.1	14.9	0.7	0.4	Pass

Stratification Test

Source	BH13
Duct Diameter (inches)	39.25
Stratification Check Analyte	VOC

*stratification not required for ducts less than 4 inches in diameter
Sample for minimum of twice the response time

Initial Three-Point Stratification

Point	Distance From Stack Wall (inches)	Average Concentration (ppmv)	Average Concentration from Mean (ppmv)	Average Concentration from Mean (%)
3	6.6	6.8	0.0	0.0
2	19.6	6.8	0.0	0.0
1	32.7	6.8	0.0	0.0
	Mean	6.8		

Required Number of Sampling Points (least restrictive)	1	1

Sample Point Criteria
If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±5.0% of the mean concentration OR ±0.5 ppmv, then unstratified; 1 sample point

If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±10.0% of the mean concentration OR ±1.0 ppmv, then minimally stratified; 3 sample points

If concentration at each traverse point differs from the mean concentration for all traverse points by greater than ±10.0% of the mean concentration OR ±1.0 ppmv, then stratified; Method 1 sample points

APEX

VOC Calibration Gas Selection

Span Value (ppmv) 50.0 VOC

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (80-90% of span value, ppmv)	40.0	42.5	45.0	Yes
Mid-Level Concentratoin Gas (45-55% of span value, ppmv)	22.5	25.0	27.5	Yes
Low-Level Concentration Gas (25-35% of span value, ppmv)	12.5	15.0	17.5	Yes
Zero-Level Concentration Gas (0% of span value, ppmv)	0.0	0.0	0.1	Yes

APEX

VOC Calibration and Drift Data

Source: BH13
Analyzer: JUM 3-300A

Operator: DMK
Date: 3/4/2021

Calibration Error Data

Response Time: 50

Span: 50

Gas Range	Cylinder Value (ppmv)	Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of calibration)	Pass/Fail
Zero gas	0.0	0.0	0.0	0.0	Pass
Low-range gas	15.0	14.8	0.2	1.3	Pass
Mid-range gas	25.0	24.9	0.1	0.4	Pass
High-range gas	42.5	42.4	0.1	0.2	Pass

Calibration Drift Data

Run 1

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.0	0.2	0.4	0.4	Pass
Low-range gas	14.8	15.1	0.7	0.6	Pass

Run 2

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.2	0.2	0.4	0.0	Pass
Low-range gas	15.1	15.2	1.3	0.2	Pass

Run 3

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.2	0.0	0.0	0.4	Pass
Low-range gas	15.2	14.9	0.7	0.6	Pass

Stratification Test

Source	Press
Duct Diameter (inches)	60
Stratification Check Analyte	VOC

*stratification not required for ducts less than 4 inches in diameter
Sample for minimum of twice the response time

Initial Three-Point Stratification

Point	Distance From Stack Wall (inches)	Average Concentration (ppmv)	Average Concentration from Mean (ppmv)	Average Concentration from Mean (%)
3	10.0	46.1	0.6	1.4
2	30.0	46.6	0.1	0.3
1	50.0	47.5	0.8	1.6
	Mean	46.7		

Required Number of Sampling Points (least restrictive)	3	1

Sample Point Criteria
If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±5.0% of the mean concentration OR ±0.5 ppmv, then unstratified; 1 sample point

If concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±10.0% of the mean concentration OR ±1.0 ppmv, then minimally stratified; 3 sample points

If concentration at each traverse point differs from the mean concentration for all traverse points by greater than ±10.0% of the mean concentration OR ±1.0 ppmv, then stratified; Method 1 sample points

APEX

NOx Calibration Gas Selection

Span Value (ppmv) 50.0 NOx

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (span value, ppmv)	N/A	50.0	N/A	Yes
Mid-Level Concentratoin Gas (40-60% of span value, ppmv)	20.0	25.0	30.0	Yes
Zero-Level Concentration Gas (<20% of span value, ppmv)	0.0	0.0	10.0	Yes

CO Calibration Gas Selection

Span Value (ppmv) 50.0 CO

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (span value, ppmv)	N/A	50.0	N/A	Yes
Mid-Level Concentratoin Gas (40-60% of span value, ppmv)	20.0	25.0	30.0	Yes
Zero-Level Concentration Gas (<20% of span value, ppmv)	0.0	0.0	10.0	Yes

VOC Calibration Gas Selection

Span Value (ppmv) 100.0 VOC

	Lower Limit	Calibration Gas	Upper Limit	Acceptable?
High-Level Concentration Gas (80-90% of span value, ppmv)	80.0	80.0	90.0	Yes
Mid-Level Concentratoin Gas (45-55% of span value, ppmv)	45.0	50.0	55.0	Yes
Low-Level Concentration Gas (25-35% of span value, ppmv)	25.0	30.0	35.0	Yes
Zero-Level Concentration Gas (0% of span value, ppmv)	0.0	0.0	0.1	Yes

APEX

NOx Calibration, Bias, and Drift Data

Source	Press	Calibration Span	50
Operator	DMK	Response Time (s)	70
Date	March 5, 2021	Serial No.	1218153462
Analyzer	Thermo Sci 42i-HL		

	Manufacturer's Certified Cylinder Value (ppmv)	Analyzer Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of Calibration Span)	Pass/Fail *
	A	B	A-B	(A-B)/CS * 100	
Low-level (or zero) calibration gas	0.0	0.0	0.0	0.0	Pass
Mid-level calibration gas	25.0	24.8	0.2	0.4	Pass
High-level calibration gas	50.0	50.0	0.0	0.0	Pass

*Calibration error must be ±2%

Run 1

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	0.0	0.0	0.0	Pass	-0.2	-0.4	Pass	0.4	Pass
Upscale (mid) level	25.0	24.8	24.7	-0.2	Pass	24.9	0.2	Pass	0.4	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 2

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	0.0	-0.2	-0.4	Pass	0.2	0.4	Pass	0.8	Pass
Upscale (mid) level	25.0	24.8	24.9	0.2	Pass	25.0	0.4	Pass	0.2	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 3

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	0.0	0.2	0.4	Pass	0.4	0.8	Pass	0.4	Pass
Upscale (mid) level	25.0	24.8	25.0	0.4	Pass	25.3	1.0	Pass	0.6	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

CO Calibration, Bias, and Drift Data

Source	Press	Calibration Span	50
Operator	DMK	Response Time (s)	80
Date	March 5, 2021	Serial No.	312
Analyzer	Teledyne 300EM		

	Manufacturer's Certified Cylinder Value (ppmv)	Analyzer Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of Calibration Span)	Pass/Fail *
	A	B	A-B	(A-B)/CS * 100	
Low-level (or zero) calibration gas	0.0	-0.4	0.4	0.8	Pass
Mid-level calibration gas	25.0	24.8	0.2	0.4	Pass
High-level calibration gas	50.0	50.4	-0.4	-0.8	Pass

*Calibration error must be ±2%

Run 1

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	-0.4	-0.1	0.6	Pass	-0.7	-0.6	Pass	1.2	Pass
Upscale (mid) level	25.0	24.8	25.0	0.4	Pass	25.0	0.4	Pass	0.0	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 2

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	-0.4	-0.7	-0.6	Pass	-0.5	-0.2	Pass	0.4	Pass
Upscale (mid) level	25.0	24.8	25.0	0.4	Pass	24.9	0.2	Pass	0.2	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

Run 3

Initial Values						Final Values				
Calibration Gas Level	Certified Calibration Gas Value (ppmv)	Direct Response (ppmv)	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/ Fail	System Response (ppmv)	System Bias (% of calibration span)	Bias: Pass/Fail	Drift (% of calibration span)	Drift: Pass/Fail
Low level gas	0.0	-0.4	-0.5	-0.2	Pass	-0.6	-0.4	Pass	0.2	Pass
Upscale (mid) level	25.0	24.8	24.9	0.2	Pass	24.9	0.2	Pass	0.0	Pass

1: System Bias must be ≤ 5% of span
2: Drift must be ≤ 3% of span or |Biasf - Biasi|≤0.5%

APEX

VOC Calibration and Drift Data

Source: Press
Analyzer: JUM 3-300A

Operator: DMK
Date: 3/5/2021

Calibration Error Data

Response Time: 50

Span: 100

Gas Range	Cylinder Value (ppmv)	Calibration Response (ppmv)	Absolute Difference (ppmv)	Calibration Error (% of calibration)	Pass/Fail
Zero gas	0.0	0.0	0.0	0.0	Pass
Low-range gas	30.0	30.4	0.4	1.3	Pass
Mid-range gas	50.0	50.4	0.4	0.8	Pass
High-range gas	80.0	79.6	0.4	0.5	Pass

Calibration Drift Data

Run 1

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.0	0.2	0.2	0.2	Pass
Mid-range gas	50.4	50.1	0.3	0.3	Pass

Run 2

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.2	0.1	0.1	0.1	Pass
Mid-range gas	50.1	49.7	1.0	0.4	Pass

Run 3

Gas Range	Initial Response (ppmv)	Final Response (ppmv)	Final Response Error (% of calibration)	Drift (% of span)	Pass/Fail
Zero gas	0.1	0.0	0.0	0.1	Pass
Mid-range gas	49.7	50.2	0.7	0.5	Pass

Airgas

Airgas USA, LLC
2009 BELLAIRE AVENUE
ROYAL OAK, MI 48067
248-399-8020
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Customer:	BUREAU VERITAS NORTH AMERICA		
Part Number:	E02NI99E15A0041	Reference Number:	32-400446862-1
Cylinder Number:	XC034476B	Cylinder Volume:	144.3 CF
Laboratory:	MIC - Royal Oak-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62014	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Oct 29, 2014

Expiration Date: Oct 29, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	125.0 PPM	126.8 PPM	G1	+/- 0.8% NIST Traceable	10/29/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062220	CC350070	97.56 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	May 25, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 CO	FTIR	Oct 14, 2014

Triad Data Available Upon Request

Approved for Release

Airgas

Airgas USA, LLC
2009 Bellaire Ave.
Royal Oak, MI 48067-8020
248-399-8020
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Customer:	ANN ARBOR		
Part Number:	E02NI99E15A02S7	Reference Number:	32-400262018-1
Cylinder Number:	CC96621	Cylinder Volume:	144.3 CF
Laboratory:	MIC - Royal Oak-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62013	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Oct 01, 2013

Expiration Date: Oct 01, 2021

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	470.0 PPM	475.4 PPM	G1	+/- 0.6% NIST Traceable	10/01/2013
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11060350	CC341302	988.8 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Dec 13, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 HCO	FTIR	Sep 10, 2013

Triad Data Available Upon Request

Notes:

AFM

Approved for Release

Airgas
an Air Liquide company

Airgas Great Lakes region
Airgas USA, LLC
5018 Empire Way
Lansing, MI 48917
Airgas.com

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: ULTRA HIGH PURITY-PURE

Part Number:	HY UHP15A	Reference Number:	25-401605276-1
Cylinder Analyzed:	CC2495	Cylinder Volume:	123.0 CF
Laboratory:	112 - Lansing-23 (SAP) - MI	Cylinder Pressure:	2000 PSIG
Analysis Date:	Sep 25, 2019	Valve Outlet:	350
Lot Number:	25-401605276-1		

ANALYTICAL RESULTS

Component		**Requested Purity**		**Certified Concentration**
HYDROGEN		99.999 %		99.999 %
CO + CO2	<	1.0 PPM	<LDL	0.088 PPM
Oxygen	<	1.0 PPM		0.20 PPM
Moisture	<	2.0 PPM		0.027 PPM
Nitrogen	<	5.0 PPM	<	5 PPM
THC	<	0.5 PPM	<LDL	0.014 PPM

Cylinders in Batch:

CC169191, CC2495, EB0016326, SG9150746BAL

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file

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Airgas
an Air Liquide company

Airgas Great Lakes region
Airgas USA, LLC
1290 Combermere Dr.
Troy, MI 48083
Airgas.com

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	32-401907062-1
Cylinder Analyzed:	CC104648	Cylinder Volume:	142.0 CF
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2000 PSIG
Analysis Date:	Sep 10, 2020	Valve Outlet:	580
Lot Number:	32-401907062-1		

Expiration Date: Sep 10, 2028

ANALYTICAL RESULTS

Component		Requested Purity		Certified Concentration
NITROGEN		99.9995 %		99.9995 %
CARBON DIOXIDE	<	1.0 PPM		0.270 PPM
NOx	<	0.1 PPM	<LDL	0.016 PPM
SO2	<	0.1 PPM	<LDL	0.091 PPM
THC	<	0.1 PPM	<LDL	0.024 PPM
CARBON MONOXIDE	<	0.5 PPM		0.130 PPM

Permanent Notes: Airgas certifies that the contents of this cylinder meet the requirements of 40 CFR 72.2

Cylinders in Batch:

ALM-022886, ALM-034619, CC104648, CC197674, CC210829, CC230729, CC307765, CC337032, CC39522, CC429544, CC443458, CC446634, SG9161109BAL, SG9168292BAL, XC012660B, XC031675B

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
Chicago, IL 60628
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X03NI98C15A08D9	Reference Number:	54-124499666-1
Cylinder Number:	CC323209	Cylinder Volume:	144.4 CF
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jul 02, 2015	Valve Outlet:	660
Lot Number:	54-124499666-1		

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
NITROGEN DIOXIDE	50.00 PPM	50.99 PPM	+/- 2%
OXYGEN	1.000 %	1.001 %	+/- 2%
NITROGEN	Balance		

Signature on file

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	BUREAU VERITAS NORTH AMERICA		
Part Number:	E02NI99E15A3615	Reference Number:	32-400961785-1
Cylinder Number:	XC034375B	Cylinder Volume:	144.3 Cubic Feet
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62017	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Aug 17, 2017

Expiration Date: Aug 17, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.6 PPM	G1	+/- 1.0% NIST Traceable	08/09/2017, 08/17/2017
NITRIC OXIDE	100.0 PPM	100.5 PPM	G1	+/- 1.1% NIST Traceable	08/09/2017, 08/17/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	130104-08	KAL004001	97.6 PPM NITRIC OXIDE/NITROGEN	+/-0.8%	May 09, 2019
PRM	12328	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
GMIS	124206889142	CC322843	4.613 PPM NITROGEN DIOXIDE/NITROGEN	+/-2.0%	Oct 13, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 NO	FTIR	Aug 12, 2017
E/N 54 Nicolet 6700 NO2	FTIR	Aug 12, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Great Lakes region
Airgas USA, LLC
1290 Combermere Dr.
Troy, MI 48083
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Customer:	BUREAU VERITAS NORTH AMERICA		
Part Number:	E02NI99E15A0919	Reference Number:	32-400961789-1
Cylinder Number:	CC98592	Cylinder Volume:	144.4 CF
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62017	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Aug 18, 2017

Expiration Date: Aug 18, 2025

Certification performed in accordance with “EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)” document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	500.0 PPM	500.4 PPM	G1	+/- 0.7% NIST Traceable	08/10/2017, 08/18/2017
NITRIC OXIDE	500.0 PPM	500.3 PPM	G1	+/- 0.7% NIST Traceable	08/10/2017, 08/18/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08011837	KAL004617	490.8 PPM NITRIC OXIDE/NITROGEN	+/- 0.57	Jun 22, 2018
PRM	12328	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
GMIS	124206889142	CC322843	4.613 PPM NITROGEN DIOXIDE/NITROGEN	+/-2.0%	Oct 13, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 NO	FTIR	Aug 12, 2017
E/N 54 Nicolet 6700 NO2	FTIR	Aug 12, 2017

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas Great Lakes region
Airgas USA, LLC
1290 Combermere Dr.
Troy, MI 48083
Airgas.com

Airgas
an Air Liquide company

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Customer:	BUREAU VERITAS NORTH AMERICA		
Part Number:	E02AI99E15A0461	Reference Number:	32-400961786-1
Cylinder Number:	CC105259	Cylinder Volume:	146.2 CF
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62017	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Aug 19, 2017

Expiration Date: Aug 19, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	85.00 PPM	84.66 PPM	G1	+/- 1.0% NIST Traceable	08/19/2017
AIR	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	000107-28	ALM020304	98.8 PPM PROPANE/AIR	+/-0.6%	Jul 12, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 C3	FTIR	Jul 24, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Great Lakes region
Airgas USA, LLC
1290 Combermere Dr.
Troy, MI 48083
Airgas.com

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	AI CZ15A	Reference Number:	32-401551476-1
Cylinder Analyzed:	CC469317	Cylinder Volume:	146.0 CF
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2000 PSIG
Analysis Date:	Jul 17, 2019	Valve Outlet:	590
Lot Number:	32-401551476-1		

Expiration Date: Jul 17, 2027

ANALYTICAL RESULTS

Component		Requested Purity		Certified Concentration
AIR				
Carbon Dioxide	<	1.0 PPM	<LDL	0.036 PPM
NOx	<	0.1 PPM	<LDL	0.015 PPM
Sulfur Dioxide	<	0.1 PPM	<LDL	0.096 PPM
THC	<	0.1 PPM	<LDL	0.015 PPM
Percent Oxygen		20-21 %		20.70 %
Carbon Monoxide	<	0.5 PPM	<LDL	0.040 PPM

Permanent Notes: Airgas certifies that the contents of this cylinder meet the requirements of 40 CFR 72.2

Cylinders in Batch:

ALM044699, ALM061717, CC109535, CC111335, CC154094, CC164089, CC20159, CC210720, CC239805, CC249648, CC287721, CC32855, CC465855, CC469317, CC469692, CC469706, CC62186, XC030447B

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file

Approved for Release

Appendix B
Sample Calculations

Sample Calculations

Note: Values obtained through sample calculations may deviate from those presented in the report based upon rounding differences.

B.1 Stack Gas Volumetric Flowrate

Moisture Content

$V_{wc} = K_2 \cdot W_1$
$V_{wsg} = K_2 \cdot W_2$

Where:

V_{wc}	=	volume of water vapor condensed in impingers at standard conditions (ft^3)
K_2	=	0.04715 ft^3/g water
W_1	=	mass of water collected in impingers (g)
V_{wsg}	=	volume of water vapor collected in silica gel at standard conditions (ft^3)
W_2	=	mass of water collected by silica gel (g)

For example, if 253.3 grams of water were condensed in the impingers and 23.7 grams of water were collected by the silica gel, the volume of water collected in each section of the sampling train, in ft^3, would be calculated as follows:

$$V_{wc} = \left(0.04715\frac{ft^3}{g}\right)(253.3\ g) = 11.9431 ft^3$$

$$V_{wsg} = \left(0.04715\frac{ft^3}{g}\right)(23.7\ g) = 1.1175 ft^3$$

The total volume of water collected = $V_{wc} + V_{wsg}$

= $11.9431\ ft^3 + 1.1175\ ft^3 = 13.0606\ ft^3$

Gas Volume Standardization

$$V_{std} = V_m Y_m \left(\frac{T_{std}}{P_{std}}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m}\right)$$

Where:

V_{std}	=	volume of gas sampled at standard conditions (ft^3, standard)
V_m	=	volume of gas measured by dry gas meter (ft^3)
Y_m	=	dry-gas meter correction factor (dimensionless)
T_{std}	=	standard temperature (528°R = 460 + 68°F)
P_{std}	=	standard pressure (29.92 in Hg)
P_b	=	barometric pressure (in Hg)
ΔH	=	average orifice differential pressure (in H_2O)
T_m	=	average meter temperature (°R)

For example, using the following values, the volume of gas sampled, corrected to standard conditions, is calculated:

V_m	=	volume of gas measured by dry-gas meter	=	38.948 ft^3
Y_m	=	dry-gas meter correction factor (dimensionless)	=	0.994
T_{std}	=	standard temperature (528°R = 460 + 68°F)	=	528 °R
P_{std}	=	standard pressure (in Hg)	=	29.92 in Hg
P_b	=	barometric pressure (in Hg)	=	28.7 in Hg
ΔH	=	average orifice differential pressure (in H_2O)	=	1.34 in H_2O
T_m	=	average meter temperature (°R)	=	509°R

$$V_{std} = (38.948 ft^3)(0.994)\left(\frac{528^oR}{29.92 \text{ in Hg}}\right)\left(\frac{28.7 \text{ in Hg} + \frac{1.34 \text{ in } H_2O}{13.6 \frac{\text{in } H_2O}{\text{in Hg}}}}{509^oR}\right) = 38.6542 \text{ ft}^3\text{, standard}$$

Moisture Fraction

$$B_{ws} = \frac{V_{wc} + V_{wsg}}{V_{wc} + V_{wsg} + V_{std}}$$

Where:

B_{ws} = exhaust gas moisture content

For example, using previously calculated values above, the exhaust gas moisture content is computed as follows:

$$B_{ws} = \frac{13.0606t^3}{13.0606t^3 + 38.6542ft^3} = 0.2525 = 25.25\%$$

Absolute Stack Gas Temperature, T_s (°R)

$$T_s = 460 + t_s$$

Where:

t_s = measured stack gas temperature (°F)

For example, if the average stack temperature was 343°F, then the average absolute stack gas temperature is

$T_s = 460 + 343 = 803$°R

Absolute Stack Gas Pressure, P_s (in Hg)

$$P_s = P_{bar} + \left(\frac{P_{stat}}{13.6}\right)$$

Where:

P_{bar} = barometric pressure at test site (in Hg)
P_{stat} = stack static pressure (in H_2O)
13.6 = specific gravity of mercury (in H_2O/in Hg)

For example, if the barometric pressure was 28.7 in Hg and the stack static pressure was -0.7 in H_2O, the absolute stack pressure would be calculated as:

$$P_s = 28.7 + \left(\frac{-0.7}{13.6}\right) = 28.65 \text{ in Hg}$$

Stack Gas Molecular Weight, Dry Basis (lb/lb-mole)

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2 + \%CO)$$

For example, if the average O_2 content of the exhaust gas stream was 17%, the CO_2 content of the gas stream was 3%, and the CO content was assumed to be negligible, the N_2 content is assumed to be the balance of the gas content (i.e. 100 – 17 – 3 – 0 = 80%). The dry stack gas molecular weight would be computed as follows:

$$M_d = 0.44(3\%) + 0.32(17\%) + 0.28(80\%) = 29.16\,\frac{\text{lb}}{\text{lb -mole}}$$

Stack Gas Molecular Weight, Wet Basis (lb/lb-mole)

$$M_s = M_d\left(1 - \frac{B_{ws}}{100}\right) + 18\,\frac{\text{lb}}{\text{lb-mole}}\left(\frac{B_{ws}}{100}\right)$$

If the average stack gas moisture content was 25.25%, then the wet stack gas molecular weight would be:

$$M_s = 29.16\,\frac{\text{lb}}{\text{lb -mole}}\left(1 - \frac{25.25}{100}\right) + 18\,\frac{\text{lb}}{\text{lb-mole}}\left(\frac{25.25}{100}\right) = 26.34\,\frac{\text{lb}}{\text{lb- mole}}$$

Stack Gas Velocity, V_s (ft/min)

$$V_s = \left(60\,\frac{\text{sec}}{\text{min}}\right) K_p C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

Where:

K_p = Pitot tube constant equal to $85.49\,\frac{\text{ft}}{\text{sec}}\sqrt{\frac{(\text{lb/lb-mole})(\text{in Hg})}{(°\text{R})(\text{in } H_2O)}}$

C_p = Pitot tube coefficient, dimensionless

$\left(\sqrt{\Delta P}\right)_{avg}$ = average square root of the velocity head of stack gas [(in $H_2O)^{0.5}$]

M_s = molecular weight of the stack gas, wet basis (lb/lb-mole)

For example, if the average square root of the velocity head of the stack gas was 0.9036 (in $H_2O)^{0.5}$, and using values already calculated, the average stack gas velocity would be calculated as follows:

$$V_s = \left(60\frac{\text{sec}}{\text{min}}\right)\left(85.49\frac{\text{ft}}{\text{sec}}\sqrt{\frac{(\text{lb/lb-mole})(\text{in Hg})}{({}^{o}R)(\text{in H}_2O)}}\right)(0.84)$$

$$\times\, 0.9036(\text{in H}_2\text{O})^{0.5}\sqrt{\frac{(803^{o}\text{R})}{(28.65\text{ inHg})\left(26.34\frac{\text{lb}}{\text{lb-mole}}\right)}} = 4{,}016\frac{\text{ft}}{\text{min}} = 66.94\frac{\text{ft}}{\text{sec}}$$

Average Stack Gas Volumetric Flowrate, Q_s (cfm)

$$Q_s = V_s \times A$$

Where:

V_s = stack gas velocity (ft/min)

A = cross-sectional area of stack (ft^2)

For example, if the exhaust stack diameter was 123 inches, then the cross-sectional area of the stack would be:

$$\frac{\pi}{4}\left(\frac{123\text{ in}}{12\ \frac{\text{in}}{\text{ft}}}\right)^2 = 82.52\text{ft}^2$$

Similarly, if the nozzle diameter was 0.245 inches, then the cross-sectional area of the nozzle would be:

$$\frac{\pi}{4}\left(\frac{0.245\text{ in}}{12\ \frac{\text{in}}{\text{ft}}}\right)^2 = 0.0003274\text{ ft}^2$$

If the stack gas velocity was measured to be 4,016 ft/min, the stack gas volumetric flowrate is:

$$Q_s = \left(4{,}016\frac{\text{ft}}{\text{min}}\right)(82.52\text{ft}^2) = 331{,}412\frac{\text{ft}^3}{\text{min}}$$

Standard Stack Gas Volumetric Flowrate, Q_{std} (scfm)

$$Q_{std} = Q_s\left(\frac{528\ {}^{o}\text{R}}{T_s}\right)\left(\frac{P_s}{29.92\text{ in Hg}}\right)$$

Where:

T_s = absolute stack gas temperature (ºR)
P_s = absolute stack gas pressure (in Hg)

For example, to standardize the values calculated above, the standard stack gas volumetric flowrate would be calculated as follows:

$$Q_{std} = 331{,}412\,\frac{ft^3}{min}\left(\frac{528°R}{803°R}\right)\left(\frac{28.65\text{ in Hg}}{29.92\text{ in Hg}}\right) = 208{,}665\,\frac{ft^3}{min}, \text{standard}$$

Dry Standard Stack Gas Volumetric Flowrate, $Q_{std,\,dry}$ (dscfm)

$$Q_{std,dry} = Q_{std}(1 - B_{ws})$$

The dry standard stack gas volumetric flowrate would be calculated as follows:

$$Q_{std,dry} = 208{,}665\,\frac{ft^3}{min}, \text{standard}(1 - 0.2525) = 155{,}977\,\frac{ft^3}{min}, \text{standard dry}$$

B.2 Isokinetic Sampling Rate (I)

$$I = \frac{100T_s \left| K_4 V_{lc} + \frac{(V_m Y)}{T_m}\left(P_{bar} + \frac{\Delta H}{13.6}\right) \right|}{60 t_s v_s P_s A_n}$$

where:

I	=	Percent of isokinetic sampling (%)
T_s	=	Absolute average stack gas temperature (°R)
K_4	=	0.002669 conversion factor $\left[\frac{(\text{in Hg})(\text{ft}^3)}{(\text{ml})(°R)}\right]$
V_{lc}	=	Total volume of liquid collected in impingers and silica gel (ml)
V_m	=	Volume of gas sample measured by dry-gas meter (ft^3, dry standard)
Y	=	Dry-gas meter correction factor (dimensionless)
T_m	=	Absolute average dry-gas meter temperature (°R)
P_{bar}	=	Barometric pressure at the sampling site (in Hg)
ΔH	=	Average pressure differential across the orifice meter (in H_2O)
13.6	=	Specific gravity of mercury
t_s	=	Total sampling time (min)
v_s	=	Stack gas velocity (ft/s)
P_s	=	Absolute stack gas pressure (in Hg)
A_n	=	Cross-sectional area of nozzle (ft^2)

The percent of isokinetic sampling, I, is calculated using the following values obtained from previous calculations and substituted into the equation above:

T_s	=	Absolute average stack gas temperature	=	803 °R
V_{lc}	=	Total volume of liquid collected in impingers and silica gel	=	277.5 ml
	=	Mass of water collected divided by the density of water		
	=	(253.3 g + 23.7 g) * (1/0.9982 g/ml)		
V_m	=	Volume of gas sample measured by dry-gas meter	=	38.948 ft^3
Y	=	Dry-gas meter calibration factor	=	0.994
T_m	=	Absolute average dry-gas meter temperature	=	509°R
P_{bar}	=	Barometric pressure at the sampling site	=	28.7 in Hg
ΔH	=	Average pressure differential across the orifice meter	=	1.34 in H_2O
t_s	=	Total sampling time	=	60 min
v_s	=	Stack gas velocity	=	66.94 ft/sec
P_s	=	Absolute stack gas pressure	=	28.65 in Hg
A_n	=	Cross-sectional area of nozzle	=	0.0003274 ft^2

$$I = \frac{(100)(803°R)\left\{\left[0.002669\ \frac{\text{in Hg}\cdot\text{ft}^3}{\text{ml}\cdot°R}\times 277.5\ \text{mL}\right] + \left[\frac{(38.948\text{ft}^3)(0.994)}{509°R}\left(28.7\ \text{in Hg} + \frac{1.34\ \text{inH}_2\text{O}}{13.6\ \frac{\text{in H}_2\text{O}}{\text{in Hg}}}\right)\right]\right\}}{60\ \frac{\text{s}}{\text{min}}\times 60\text{min}\times 66.94\frac{\text{ft}}{\text{s}}\times 28.65\ \text{in Hg}\times 0.0003274\ \text{ft}^2} = 104\%$$

B.3 Carbon Monoxide Concentration

Analyzer Drift Correction

$$C_{Gas} = (C_{AVE} - C_O)\left(\frac{C_{MA}}{C_M - C_O}\right)$$

Where:

C_{Gas}	=	Average effluent gas concentration adjusted for bias, dry basis (ppmv)
C_{Ave}	=	Average unadjusted gas concentration indicated by data recorder for the test run, dry basis (ppmv)
C_O	=	Average of the initial and final system calibration bias check responses for the zero calibration gas (ppmv)
C_{MA}	=	Actual concentration of the upscale calibration gas (ppmv)
C_M	=	Average of initial and final system calibration bias check responses for the upscale calibration gas (ppmv)

For example, the effluent gas concentration, dry basis, is calculated as follows:

C_{Ave}	=	Average unadjusted gas concentration indicated by data recorder for the test run, dry basis (ppmv)	= 24.2 ppmv
C_O	=	average of the initial (2.0 ppmv) and final (1.5 ppmv) zero calibration gas check	= 1.75 ppmv
C_{MA}	=	actual concentration of the upscale calibration gas	= 100 ppmv
C_M	=	average of the initial (103.7 ppmv) and final (101.3 ppmv) upscale calibration gas check	= 102.5 ppmv

$$C_{Gas} = (24.2 - 1.75)\left(\frac{100}{102.5 - 1.75}\right) = 22.3 \text{ ppmv}$$

Concentration as mg/m³

$$C = C_{Gas}\left(\frac{MW}{24.04}\right)$$

Where:

C	=	concentration, mg/m^3
C_{Gas}	=	effluent gas concentration adjusted for bias, ppmv
MW	=	molecular weight as gram-mole
24.04	=	ideal gas molar volume at standard temperature (68°F) and pressure (29.92 in. Hg), L/mole

For example, if the carbon monoxide concentration was 22.3 ppmv, the molecular weight is 28.01 grams per mole; therefore, the concentration in mg/m^3 is calculated as:

$$C = \frac{22.3}{1{,}000{,}000}\left(\frac{28.01\text{ gram}}{1\text{ mole}}\right)\left(\frac{1\text{ mole}}{24.04\text{ L}}\right)\left(\frac{1{,}000\text{ L}}{\text{m}^3}\right)\left(\frac{1{,}000\text{ mg}}{1\text{ gram}}\right) = 25.96\,\frac{\text{mg}}{\text{m}^3}$$

Mass Emission Rate

$$(\text{lb/hr}) = CQ\left[\frac{\left(60\,\frac{\text{min}}{\text{hr}}\right)}{\left(453{,}590\,\frac{\text{mg}}{\text{lb}}\right)\left(35.31\,\frac{\text{ft}^3}{\text{m}^3}\right)}\right]$$

Where:

Q = flowrate (scfm)

For example, if the standardized flowrate was 155,977 scfm, then the CO mass emission rate is calculated as follows:

$$\left(\frac{\text{lb}}{\text{hr}}\right) = \left(25.96\,\frac{\text{mg}}{\text{m}^3}\right)\left(155{,}977\,\frac{\text{ft}^3}{\text{min}}\right)\left[\frac{\left(60\,\frac{\text{min}}{\text{hr}}\right)}{\left(453{,}590\,\frac{\text{mg}}{\text{lb}}\right)\left(35.31\,\frac{\text{ft}^3}{\text{m}^3}\right)}\right] = 15.2\,\frac{\text{lb}}{\text{hr}}$$

Mass Emission Rate

$$\left(\frac{\text{lb}}{\text{oven dried ton}}\right) = \frac{\left(\frac{\text{lb}}{\text{hr}}\right)}{\left(\frac{\text{oven dried ton}}{\text{hr}}\right)}$$

Where:

Oven dried ton/hr = hourly flake production rate

For example, if the hourly flake production rate was 43.47 oven dried ton/hr, then the CO mass emission rate is calculated as follows:

$$\left(\frac{\text{lb}}{\text{oven dried ton}}\right) = \frac{15.2\,\frac{\text{lb}}{\text{hr}}}{43.47\,\frac{\text{oven dried ton}}{\text{hr}}} = 0.35\,\frac{\text{lb}}{\text{oven dried ton}}$$

Appendix C
Field Data Sheets

APEX

USEPA Method 1
Sampling and Velocity Traverse Point Determination

Plant Name: Arauco
City, State: Grayling, MI
Sampling Location: RTO Outlet

Number of Ports Available: 4
Number of Ports Used: 4
Port Inside Diameter: 6

Distance from Far Wall to Outside of Port: 130"
Nipple Length and/or Wall Thickness: 7"
Depth of Stack or Duct: 123"
Stack or Duct Width (if Rectangular): —

Equivalent Diameter:

$D_E = \frac{2 \text{ x depth x width}}{\text{depth + width}} = \frac{2 \text{ x } (\quad) \text{ x } (\quad)}{(\quad) + (\quad)} =$ —

Distance from Ports	**Upstream**	**Downstream**
to Flow Disturbances:	33'	39'
Diameters:	3.2	3.8

Stack/Duct Area= ______ = ______ in^2 (must be > 113 in^2)

Draw horizontal line through diameters

If more than 8 and 2 diameters and if duct diameter is 12 - 24 in, use 8 or 9 points

Velocity **Particulate**

Diameters

Up Down

Up	Down
8	2.0
7	1.75
6	1.5
5	1.25
2	0.5

Velocity: 12, 16 — Particulate: 12, 16, 20, 24 (24 circled)

Point	% of Duct Depth	Distance From Inside Wall	Distance from Outside of Port
1	2.1	2.6	9.6
2	6.7	8.2	15.2
3	11.8	14.5	21.5
4	17.7	21.8	28.8
5	25.0	30.8	37.8
6	35.6	43.8	50.8
7			
8			
9			
10			
11			
12			

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	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

Location of Points in Rectangular Stacks or Ducts

	3	4	5
1	16.7	12.5	10.0
2	50.0	37.5	30.0
3	83.3	62.5	50.0
4		87.5	70.0
5			90.0

Do not place points closer to stack walls than:
1.0 in for stack diameter > 24 in
0.5 in for stack diameter 12 to < 24 in

For rectangular stacks, use only the following matrices:

No. Pts	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
25	5 x 5

Checked for completeness: ✓
Checked by (signature): DMC

APEX

USEPA Method 1
Sampling and Velocity Traverse Point Determination

Plant Name: Arauco
City, State: Grayling, MI
Sampling Location: Baghouse 11

Number of Ports Available: 3
Number of Ports Used: 2
Port Inside Diameter: 6"

Distance from Far Wall to Outside of Port: 55.75"
Nipple Length and/or Wall Thickness: 6.5"
Depth of Stack or Duct: 49.25"
Stack or Duct Width (if Rectangular): —

Equivalent Diameter:

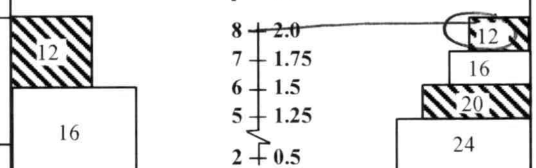
$D_E = \frac{2 \times depth \times width}{depth + width} = \frac{2 \times (\ \ ) \times (\ \ )}{(\ \ ) + (\ \ )} =$ —

Distance from Ports	Upstream	Downstream
to Flow Disturbances:	50'	16'
Diameters:	12.2	3.9

Stack/Duct Area= ______ = ______ in² (must be > 113 in²)

Draw horizontal line through diameters

If more than 8 and 2 diameters and if duct diameter is 12 - 24 in, use 8 or 9 points



Point	% of Duct Depth	Distance From Inside Wall	Distance from Outside of Port
1	4.4	2.2	8.7
2	14.6	7.2	13.7
3	29.6	14.6	21.1
4	70.4	34.7	41.2
5	85.4	42.1	48.6
6	95.6	47.1	53.6
7			
8			
9			
10			
11			
12			

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	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

Location of Points in Rectangular Stacks or Ducts

	3	4	5
1	16.7	12.5	10.0
2	50.0	37.5	30.0
3	83.3	62.5	50.0
4		87.5	70.0
5			90.0

Do not place points closer to stack walls than:
1.0 in for stack diameter > 24 in
0.5 in for stack diameter 12 to < 24 in

For rectangular stacks, use only the following matrices:

No. Pts	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
25	5 x 5

Checked for completeness: ✓
Checked by (signature): DMK

USEPA Method 1
Sampling and Velocity Traverse Point Determination

Plant Name: Arauco
City, State: Grayling, MI
Sampling Location: Baghouse 13

Number of Ports Available: 3
Number of Ports Used: 2
Port Inside Diameter: 6"

Distance from Far Wall to Outside of Port: 45.25"
Nipple Length and/or Wall Thickness: 6"
Depth of Stack or Duct: 39.25"
Stack or Duct Width (if Rectangular): —

Equivalent Diameter:

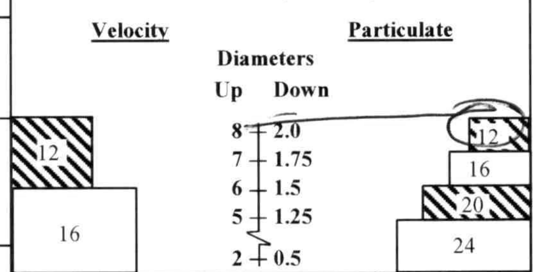
$$D_E = \frac{2 \times depth \times width}{depth + width} = \frac{2 \times (\quad) \times (\quad)}{(\quad) + (\quad)} = —$$

Distance from Ports to Flow Disturbances:	Upstream	Downstream
	50'	16'
Diameters:	15.3	4.9

Stack/Duct Area= ______ = ______ in^2 (must be > 113 in^2)

Draw horizontal line through diameters

If more than 8 and 2 diameters and if duct diameter is 12 - 24 in, use 8 or 9 points



Point	% of Duct Depth	Distance From Inside Wall	Distance from Outside of Port
1	4.4	1.7	7.7
2	14.6	5.7	11.7
3	29.6	11.6	17.6
4	70.4	27.6	33.6
5	85.4	33.5	39.5
6	95.6	37.5	43.5
7			
8			
9			
10			
11			
12			

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	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

Location of Points in Rectangular Stacks or Ducts

	3	4	5
1	16.7	12.5	10.0
2	50.0	37.5	30.0
3	83.3	62.5	50.0
4		87.5	70.0
5			90.0

Do not place points closer to stack walls than:
1.0 in for stack diameter > 24 in
0.5 in for stack diameter 12 to < 24 in

For rectangular stacks, use only the following matrices:

No. Pts	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
25	5 x 5

Checked for completeness: ✓
Checked by (signature): DMK

APEX

USEPA Method 1
Sampling and Velocity Traverse Point Determination

Plant Name: Arauco
City, State: Grayling, MI
Sampling Location: Press

Number of Ports Available: 3
Number of Ports Used: 2
Port Inside Diameter: 6"

Distance from Far Wall to Outside of Port: 69"
Nipple Length and/or Wall Thickness: 9"
Depth of Stack or Duct: 60"
Stack or Duct Width (if Rectangular): —

Equivalent Diameter:

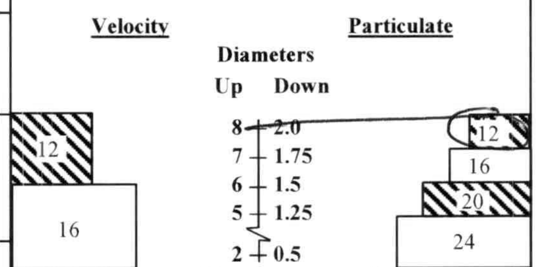
$D_E = \frac{2 \times depth \times width}{depth + width} = \frac{2 \times (\ ) \times (\ )}{(\ ) + (\ )} =$ —

	Upstream	Downstream
Distance from Ports to Flow Disturbances:	50'	25'
Diameters:	10	5

Stack/Duct Area= ________ = ________ in^2
(must be > 113 in^2)

Draw horizontal line through diameters

If more than 8 and 2 diameters and if duct diameter is 12 - 24 in, use 8 or 9 points



Point	% of Duct Depth	Distance From Inside Wall	Distance from Outside of Port
1	4.4	2.6	11.6
2	14.6	8.8	17.8
3	29.6	17.8	26.8
4	70.4	42.2	51.2
5	85.4	51.2	60.2
6	95.6	57.4	66.4
7			
8			
9			
10			
11			
12			

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	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

Location of Points in Rectangular Stacks or Ducts

	3	4	5
1	16.7	12.5	10.0
2	50.0	37.5	30.0
3	83.3	62.5	50.0
4		87.5	70.0
5			90.0

Do not place points closer to stack walls than:
1.0 in for stack diameter > 24 in
0.5 in for stack diameter 12 to < 24 in

For rectangular stacks, use only the following matrices:

No. Pts	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
25	5 x 5

Checked for completeness: DK
Checked by (signature): DMK

Run: Pre

Date 3/2/21
Time 7:30

APEX

USEPA Method 2
Gas Velocity Traverse and Volumetric Flowrate

Facility	Arauco			**Operators**	TMZ
Sampling Location	RTO Outlet			**Pitot Tube**	
Stack Diameter, in		**Area, ft²**		**Pitot Tube Factor, C_p**	0.84
Stack Dimension, in	NA	**Port Length, in**		**Cyclonic Flow Check**	✓
Gas Temperature, °F WB	NA			**Abs. Bar. Press., in Hg**	
Gas Temperature, °F DB				**P_{bar}, Bar. Press., in Hg**	28.7
% CO_2	3	**% CO**	0	**P_{stat}, Static Press., in H_2O**	-0.7550
% O_2	17	**% N_2**	80	**% Moisture, v/v**	
Pre-Test Pitot Leak Rate	Electronic	in H_2O for 1 min at ____ in H_2O		**Molecular Weight, M_d**	
Post-Test Pitot Leak Rate		in H_2O for 1 min at ____ in H_2O		**Molecular Weight, M_s**	

Port	Traverse Point	Velocity Head Difference (ΔP) (in H_2O)	Stack Temperature °F	$(\Delta P)^{0.5}$ $(in\ H_2O)^{0.5}$	Null Angle (zero ΔP angle)	Cosine Null Angle ($\cos \theta_{y(i)}$)	Velocity of Stack Gas V_{ai} (ft/sec)
A	4 6	0.8477			0		
	3 5	0.6744			0		
	2 4	1.009			0		
	1 3	0.9438			0		
	2	0.8934			0		
B	4 1	0.5628			0		
	3				0		
	2 6	0.6377			0		
	1 5	0.5376			0		
	4	0.8944			0		
C	4 3	0.6200			0		
	3 2	0.5820			0		
	2 1	0.2576			0		
	1						
	6	0.6080			0		
D	4 5	0.5184			0		
	3 4	0.7052			0		
	2 3	0.5744			0		
	1 2	0.5522			0		
	1	0.4063			0		
	6	0.8672			0		
	5	0.7576			0		
	4	0.9348			0		
	3	1.082			0		
	2	0.9744			0		
	1	0.6837			0		
Average		#DIV/0!	#DIV/0!	#DIV/0!			

Comments

P_s	-	in Hg
V_s	**#DIV/0!**	ft/min
Q_s	**#DIV/0!**	cfm
Q_{std}	**#DIV/0!**	scfm
Q	**#DIV/0!**	dscfm

Run

1

APEX

Date 3/2/21

Time 8:59

USEPA Method 2
Gas Velocity Traverse and Volumetric Flowrate

Facility	Arauco			**Operators**	WZ
Sampling Location	RTO Outlet			**Pitot Tube**	
Stack Diameter, in	123	**Area, ft^2**		**Pitot Tube Factor, C_p**	0.84
Stack Dimension, in	NA	**Port Length, in**		**Cyclonic Flow Check**	✓
Gas Temperature, °F WB	NA			**Abs. Bar. Press., in Hg**	28.7
Gas Temperature, °F DB				**P_{bar}, Bar. Press., in Hg**	
% CO_2 3		**% CO**	0	**P_{stat}, Static Press., in H_2O**	-0.7114
% O_2 17		**% N_2**	80	**% Moisture, v/v**	
Pre-Test Pitot Leak Rate	Electronic	in H_2O for 1 min at	in H_2O	**Molecular Weight, M_d**	
Post-Test Pitot Leak Rate		in H_2O for 1 min at	in H_2O	**Molecular Weight, M_s**	

Port	Traverse Point	Velocity Head Difference (ΔP) (in H_2O)	Stack Temperature °F	$(\Delta P)^{0.5}$ $(\text{in } H_2O)^{0.5}$	Null Angle (zero ΔP angle)	Cosine Null Angle ($\cos \theta_{y(i)}$)	Velocity of Stack Gas V_{ai} (ft/sec)
A	6	0.6572	332				
	5	0.5764	333				
	4	0.4671	333				
	3	0.4714	334				
	2	0.5358	333				
	1	0.4200	334				
B	6	0.6859	331				
	5	0.6846	333				
	4	0.8275	333				
	3	0.7056	333				
	2	0.6728	333				
	1	0.4715	333				
C	6	0.7415	332				
	5	0.8641	334				
	4	0.9252	333				
	3	0.7347	334				
	2	0.4724	334				
	1	0.4246	334				
D	6	0.8166	335				
	5	1.046	335				
	4	1.058	336				
	3	1.021	336				
	2	1.122	336				
	1	0.6407	336				
Average		#DIV/0!	#DIV/0!	#DIV/0!			

Comments

P_s	-	in Hg
V_s	**#DIV/0!**	ft/min
Q_s	**#DIV/0!**	cfm
Q_{std}	**#DIV/0!**	scfm
Q	**#DIV/0!**	dscfm

APEX

Run	Run 1	**Date**	3/2/21
Facility	Arauco	**Time**	9:45
Source Designation	RTO Outlet		
Operator	[illegible]		
Filter No.	2011254608V		

$K_f = 1.63$

1.63 / 2.85

Barometric Pressure (P_b)	28.7	in Hg
Stack Static Pressure (P_s)	-0.7	in H_2O
Stack Dimensions (Diameter)	123	in
Pitot Tube	45	
Meter No.	2	
ΔH at 0.75 cfm	1.83	

Assumed Moisture (B_{ws})	20	
Nozzle Diameter	0.245	in
Leak Rate Initial	0.000	ft^3/min at 7 in Hg
Leak Rate Final	0.020	ft^3/min at 6 in Hg
Traverse Points	24	
Pitot Correction Factor (C_p)	0.84	
Meter Correction Factor (Y)	0.994	
Gas Composition CO_2	3	%
O_2	17	%

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	9:45	3	334	0.60	0.98	793.517	38	38	254	255	25	67
5			3	334	0.57	0.92	794.97	38	38	257	255	26	67
4	5		3	334	0.86	1.46	796.41	38	38	255	255	26	67
3			3	334	0.54	0.88	797.61	37	38	256	255	26	67
2	10		3	334	0.59	0.95	799.22	39	38	255	255	26	67
1			3	334	0.49	0.79	800.38	39	38	255	255	26	67
Port	15	10:00					801.68						
6	15	10:01	3	343	0.88	1.43	801.68	40	37	254	255	25	69
5			3	344	0.83	1.35	803.35	40	39	254	255	27	71
4	20		3	344	1.02	1.63	805.01	40	38	256	255	28	73
3			3	343	0.87	1.42	806.71	41	38	254	255	33	75
2	25		4	335	0.91	1.48	808.06	41	38	256	255	37	77
1			4	337	0.73	1.19	810.13	41	38	254	255	43	78
Port	30	1016					811.71						
6	30	1017	4	337	0.62	[illegible]	811.71	41	38	254	255	43	77
5			5	337	0.64	1.00	813.26	42	41	254	256	43	75
4	35		5	335	0.72	1.19	815.38	42	39	252	251	45	76
3			5	333	0.55	0.88	816.30	42	39	250	252	46	77
2	40		4	333	0.50	0.82	817.81	43	40	251	251	46	77
1			4	336	0.43	0.70	819.05	44	40	253	251	47	78
Port	45	1032					820.265						
6	45	1034	4	334	0.77	1.25	820.265	45	40	256	256	50	78
5			4	334	0.86	1.40	821.87	45	40	255	255	50	78
4	50		4	323	0.81	1.32	823.61	45	40	255	255	51	78
3			4	335	1.1	1.79	825.27	46	41	255	255	51	79
2	55		4	336	0.98	1.60	827.17	47	41	255	255	51	79
1			4	340	0.72	1.17	828.98	47	42	256	255	52	80
End	60	1049					830.565						

APEX

Run	Run 2	**Date**	3/2/21
Facility	Arauco	**Time**	11:05
Source Designation	RTO Outlet		
Operator	TM		
Filter No.	2011255918V		

$K_f = 1.63$

Barometric Pressure (P_b)	28.7	in Hg
Stack Static Pressure (P_s)	-0.7	in H_2O
Stack Dimensions (Diameter)	173	in
Pitot Tube	45	
Meter No.	2	
ΔH at 0.75 cfm	1.83	

Assumed Moisture (B_{ws})	.20			
Nozzle Diameter	0.245	in		
Leak Rate Initial	0.000	ft^3/min at	9	in Hg
Leak Rate Final	0.000	ft^3/min at	5	in Hg
Traverse Points	24			
Pitot Correction Factor (C_p)	0.84			
Meter Correction Factor (Y)	0.944			
Gas Composition CO_2	3	%		
O_2	17	%		

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	11:05	3	345	0.67	1.09	830.658	48	43	254	256	26	66
5			3	341	0.63	1.02	832.23	49	44	257	256	31	71
4	5		3	344	0.74	1.21	833.76	50	45	255	255	33	72
3			3	345	0.86	1.40	834.97	51	45	255	255	35	72
2	10		3	345	0.82	1.38	836.97	52	45	255	255	35	72
1			3	346	0.52	0.89	838.56	53	46	255	253	36	72
Port	15	11:20					839.400						
6	15	11:21	3	348	0.89	1.45	839.400	53	46	256	255	40	73
5			3	339	1.1	1.79	841.56	52	46	254	255	41	73
4	20		3	344	1.0	1.63	843.41	52	47	254	255	41	74
3			3	347	0.91	1.48	845.02	52	47	252	257	42	74
2	25		3	344	0.79	1.28	846.73	51	47	255	255	42	74
1			3	347	0.72	1.17	848.36	50	47	255	255	43	75
Port	30	11:36					850.010						
6	30	11:37	3	344	0.91	1.48	850.010	49	47	255	255	43	72
5			3	341	0.71	1.16	851.55	49	47	255	255	43	72
4	35		3	337	0.68	1.11	853.10	49	47	254	255	44	71
3			3	344	0.83	1.35	854.57	48	47	254	255	45	70
2	40		3	335	0.74	1.21	856.16	48	47	255	255	47	70
1			3	347	0.65	1.05	857.72	50	47	256	255	48	70
Port	45	11:52					859.163						
6	45	11:53	3	341	0.85	1.38	859.163	51	47	255	255	50	70
5			4	331	1.1	1.79	860.70	52	47	255	255	51	70
4	50		4	347	1.0	1.6	862.57	53	47	254	255	51	71
3			4	335	1.0	1.6	864.41	54	47	254	255	52	71
2	55		4	339	0.90	1.47	866.12	54	47	254	255	52	72
1			4	341	0.71	1.16	867.88	54	47	253	255	53	73
End	60	12:08					869.601						

APEX

Kf=1.63

.96

Run	Run 3	Date	3/2/21
Facility	Acauco	Time	12:16
Source Designation	RTO Outlet		
Operator	TM		
Filter No.	20112547		

Barometric Pressure (P_b)	28.7	in Hg
Stack Static Pressure (P_s)	-0.7	in H_2O
Stack Dimensions (Diameter)	123	in
Pitot Tube	45	
Meter No.	2	
ΔH at 0.75 cfm	1.83	

Assumed Moisture (B_{ws})	20			
Nozzle Diameter	0.245	in		
Leak Rate Initial	0.000	ft³/min at	9	in Hg
Leak Rate Final	0.000	ft³/min at	7	in Hg
Traverse Points	24			
Pitot Correction Factor (C_p)	0.84			
Meter Correction Factor (Y)	0.994			
Gas Composition CO_2	3	%		
O_2	17	%		

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	12:16	5	350	0.9659	1.5	869.75	48	48	253	257	41	67
5	2.5		5	349	0.8742	1.41	871.40	48	48	256	256	35	68
4	5		5	349	0.8599	1.38	873.00	49	48	255	255	37	75
3	7.5		5	346	0.97	1.60	874.60	51	47	254	256	39	83
2	10		5	332	0.77	1.25	876.34	53	48	255	255	41	87
1	12.5		5	336	0.74	1.20	878.03	52	47	254	255	42	81
Port	15	12:31					879.831						
6	15	12:33	5	342	0.70	1.12	879.831	52	47	255	255	45	80
5	17.5		5	340	0.58	0.95	881.20	52	47	255	255	47	82
4	20		5	334	0.73	1.19	882.54	51	47	255	255	48	79
3	22.5		5	331	0.72	1.17	884.16	50	48	256	255	48	74
2	25		5	334	0.56	0.91	885.77	50	48	256	255	48	72
1	27.5		5	335	0.51	0.83	887.19	48	47	255	256	48	72
Port	30	12:48					888.491						
6	30	12:49	5	339	0.67	1.09	888.491	47	46	255	255	47	71
5	32.5		5	341	0.69	1.12	890.00	46	46	256	255	47	71
4	35		5	340	0.68	1.11	891.52	46	46	255	255	47	71
3	37.5		5	342	0.81	1.32	892.97	46	46	254	255	46	74
2	40		5	334	0.60	0.98	894.66	46	46	255	255	47	77
1	42.5		5	334	0.58	0.94	896.14	46	46	256	256	47	77
Port	45	13:04					897.521						
6	45	13:05	5	342	0.93	1.52	897.521	45	45	255	254	48	68
5	47.5		5	337	1.00	1.63	899.49	43	44	256	255	48	72
4	50		5	335	1.1	1.80	900.97	43	41	254	256	48	77
3	52.5		5	334	1.1	1.80	902.91	43	44	258	255	48	77
2	55		5	340	0.94	1.53	904.70	43	43	256	255	49	73
1	57.5		5	343	0.67	1.09	906.43	43	43	256	255	50	73
End	60	13:20					908.733						

2
1.63
.87
11.41
130.40
1412

Moisture Recovery Form for Method 202

Plant	Aravco
Date	3-2-21
Sampling Location	RTO Outlet
Run Number	[illegible]
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	RTO Outlet Run [illegible]
PM Filter Number	20112[illegible] BV
Comments (sample appearance, odor, color, etc.):	[illegible] 546

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight		
				Final (g)	Initial (g)	Weight Gain (g)
1	Empty	0	Dropout	564.3	487.6	76.7
2	Empty	0	Modified	692.6	642.5	50.1
CPM Filter						
3	Water	100	Modified	798.4	759.1	39.3
4	Silica	200-300	Modified	965.9	937.0	28.9
					Total Weight Gain (g)	195.0

APEX

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-2-21
Sampling Location	RTO Outlet
Run Number	2
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	RTO Outlet Run 2
PM Filter Number	20112559 BV
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	608.3	499.0	109.3
2	Empty	0	Modified	746.5	658.3	88.2
CPM Filter						
3	Water	100	Modified	815.5	759.7	55.8
4	Silica	200-300	Modified	927.2	903.5	23.7
					Total Weight Gain (g)	277.0

APEX

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-2-21
Sampling Location	RTO Outlet
Run Number	3
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	RTO Outlet Run 3
PM Filter Number	20112547 BV
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	590.8	487.0	103.8
2	Empty	0	Modified	708.1	642.0	66.1
CPM Filter						
3	Water	100	Modified	824.7	798.2	26.5
4	Silica	200-300	Modified	914.8	900.4	14.4
					Total Weight Gain (g)	210.8

APEX

Run	Run 1
Facility	Arauco
Source Designation	Baghouse 11
Operator	BY
Filter No.	Run 1
Barometric Pressure (P_b)	29.88 in Hg
Stack Static Pressure (P_s)	+1.1 in H_2O
Stack Dimensions (Diameter)	49.25 in
Pitot Tube	SPTA
Meter No.	2
ΔH at 0.75 cfm	1.83

Date	2/3/21
Time	722
Assumed Moisture (B_{ws})	.02
Nozzle Diameter	0.180 in
Leak Rate Initial	0.000 ft^3/min at 12 in Hg
Leak Rate Final	0.000 ft^3/min at 6 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.944
Gas Composition	CO_2 0 %; O_2 21 %

Comment: pitot

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	722	5	81	1.5	1.5	908.24	26	26	251	255	26	65
5	5		5	81	1.6	1.6	911.90	27	25	252	256	28	65
4	10		4	81	1.4	1.4	915.10	27	25	252	255	31	67
3	15		4	81	1.4	1.4	918.40	28	26	252	255	32	67
2	20		3	81	1.3	1.3	921.68	28	26	251	255	33	69
1	25		3	81	1.2	1.2	924.90	28	26	256	256	34	70
BRT	30	752					927.95						
6	30	755	4	80	1.4	1.4	927.95	31	26	251	254	33	70
5	35		4	80	1.5	1.5	931.06	32	27	250	255	39	70
4	40		4	81	1.6	1.6	934.44	32	27	254	255	39	68
3	45		4	81	1.2	1.2	938.00	33	27	255	256	39	68
2	50		4	81	1.1	1.1	941.06	33	27	253	255	39	68
1	55		3	81	1.1	1.1	943.90	33	27	254	255	39	69
END	60	825					946.29						

APEX

Run	Run 2
Facility	Arauco
Source Designation	Baghouse 11
Operator	
Filter No.	Bwl
Barometric Pressure (P_b)	29.88 in Hg
Stack Static Pressure (P_s)	-1.1 in H_2O
Stack Dimensions (Diameter)	49.25 in
Pitot Tube	6674
Meter No.	2
ΔH at 0.75 cfm	1.83

Date	3/3/21
Time	843

Assumed Moisture (B_{ws})	~2
Nozzle Diameter	0.180 in
Leak Rate Initial	0.000 ft³/min at 13 in Hg
Leak Rate Final	0.000 ft³/min at 7 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition CO_2	0 %
O_2	17 %

Comment

Traverse Point	Sampling Time (minute)	Sampling Time Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
12 6	0	843	4	81	1.2	1.2	946.87	31	29	244	256	37	65
11 5	5		4	81	1.3	1.3	949.65	31	29	250	255	38	
10 4	10		4	82	1.4	1.4	952.40	33	29	257	255	38	66
9 3	15		4	83	1.3	1.3	955.37	35	29	256	255	37	67
8 2	20		4	83	1.1	1.1	958.51	36	29	255	255	37	68
7 1	25		4	83	1.1	1.1	961.53	36	30	255	256	38	68
G Port	30	913					964.35						69
6	30	915	4	83	1.3	1.3	964.55	37	30	252	252	39	71
5	35		4	82	1.4	1.4	967.80	37	30	253	252	41	73
4	40		4	82	1.5	1.5	971.10	39	31	253	255	39	73
3	45		4	82	1.4	1.4	974.75	40	33	255	253	40	75
2	50		4	82	1.2	1.2	978.02	40	33	256	244	40	76
1	55		4	82	1.1	1.1	981.15	41	34	251	255	40	76
End	60	945					984.18						

APEX

Run	Run 3
Facility	Arauco
Source Designation	Baghouse 11
Operator	
Filter No.	Run 3
Barometric Pressure (P_b)	29.88 in Hg
Stack Static Pressure (P_s)	+1.1 in H_2O
Stack Dimensions (Diameter)	44.25 in
Pitot Tube	5-7A
Meter No.	2
ΔH at 0.75 cfm	1.83

Date	3/3/21
Time	1000

Assumed Moisture (B_{ws})	~2
Nozzle Diameter	0.180 in
Leak Rate Initial	0.000 ft³/min at 11 in Hg
Leak Rate Final	0.000 ft³/min at 5 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition	CO_2 0 % ; O_2 21 %

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	1000	4	82	1.5	1.5	987.30	40	37	251	256	39	66
5	5		4	82	1.6	1.6	989.80	42	37	250	251	40	68
4	10		4	82	1.6	1.6	991.45	43	37	251	252	41	69
3	15		4	82	1.3	1.3	994.05	45	38	252	253	41	70
2	20		4	82	1.2	1.2	998.35	46	39	252	253	41	71
1	25		4	82	1.2	1.2	1001.60	46	39	255	253	42	71
Port	30	10:30					1004.920						
6	35	10:34	4	83	1.2	1.2	1004.920	47	39	255	255	44	68
5	36		4	83	1.4	1.4	1008.25	48	39	256	254	45	69
4	40		4	82	1.4	1.4	1011.70	48	40	250	254	49	72
3	45		4	82	1.2	1.2	1015.15	48	41	251	256	50	74
2	50		4	82	1.1	1.1	1018.40	50	42	251	253	52	76
1	55		4	82	1.1	1.1	1021.62	52	44	252	253	53	76
End	60	11:04					1024.650						

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-3-21
Sampling Location	Baghouse 11
Run Number	1
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	BH 11 Run 1
PM Filter Number	20112560BV
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	498.3	498.2	
2	Empty	0	Modified	659.1	659.1	
CPM Filter						
3	Water	100	Modified	760.6	760.0	
4	Silica	200-300	Modified	962.6	954.9	
					Total Weight Gain (g)	

Moisture Recovery Form for Method 202

Plant	Aravco
Date	3-2-21
Sampling Location	Baghouse 11
Run Number	2
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	BH 11 Run 2
PM Filter Number	20112562BV
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight		
				Final (g)	Initial (g)	Weight Gain (g)
1	Empty	0	Dropout	487.3	487.3	
2	Empty	0	Modified	642.1	642.1	
CPM Filter						
3	Water	100	Modified	777.3	776.3	
4	Silica	200-300	Modified	994.2	984.1	
					Total Weight Gain (g)	

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-3-21
Sampling Location	Baghouse 11
Run Number	3
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	BH 11 Run 3
PM Filter Number	20112561
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	498.1	498.1	
2	Empty	0	Modified	659.1	659.0	
CPM Filter						
3	Water	100	Modified	760.9	760.6	
4	Silica	200-300	Modified	973.1	962.6	
					Total Weight Gain (g)	

APEX

Run	Run 1
Facility	Arauco
Source Designation	BH 13
Operator	TZ
Filter No.	2001
Barometric Pressure (P_b)	29.7 in Hg
Stack Static Pressure (P_s)	-1.2 in H_2O
Stack Dimensions (Diameter)	39.25 in
Pitot Tube	30
Meter No.	2
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	~2.
Nozzle Diameter	0.180 in
Leak Rate Initial	0.000 ft^3/min at 7 in Hg
Leak Rate Final	0.000 ft^3/min at 5 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition CO_2	0 %
Gas Composition O_2	21 %

$k_f = 1$

Date: 3/?4/21

Time: 7:59

Comment:

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	7:59	3	67	1.2	1.2	25.019	16	16	250	255	14	68
5	5		3	67	1.4	1.4	28.86	16	16	249	255	16	69
4	10		3	67	1.6	1.6	31.44	16	16	249	255	17	70
3	15		3	67	1.6	1.6	34.52	16	16	247	252	18	70
2	20		3	67	1.3	1.3	38.20	17	16	247	256	20	70
1	25		3	67	1.3	1.3	41.68	18	16	245	255	22	70
Port	30	8:29					44.890						
6	30	8:39	3	67	0.96	0.96	44.890	19	16	248	255	22	70
5	35		3	68	1.3	1.3	47.66	20	16	246	255	23	71
4	40		3	67	1.3	1.3	50.44	21	17	246	255	23	71
3	45		3	67	1.7	1.7	54.24	21	17	249	255	21	70
2	50		3	67	1.4	1.4	57.88	21	18	246	255	21	70
1	55		3	67	1.3	1.3	60.84	21	18	248	255	21	68
END	60	9:09					64.751						

APEX

Run	Run 2
Facility	Arauco
Source Designation	BH-13
Operator	[illegible] TMZ
Filter No.	Run 2
Barometric Pressure (P_b)	29.7 in Hg
Stack Static Pressure (P_s)	-1.2 in H_2O
Stack Dimensions (Diameter)	34.25 in
Pitot Tube	[illegible] 30
Meter No.	2
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	~2
Nozzle Diameter	0.180 in
Leak Rate Initial	0.000 ft³/min at 8 in Hg
Leak Rate Final	0.000 ft³/min at 5 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition	CO_2 0 %; O_2 21 %

Date	3/4/21
Time	9:31

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	9:31	3	67	1.1	1.1	64.806	18	18	246	255	18	78
5	5		3	67	1.5	1.5	67.91	19	18	248	255	18	74
4	10		3	67	1.2	1.2	70.99	20	18	248	257	18	73
3	15		3	67	1.4	1.4	74.51	21	18	245	255	19	70
2	20		3	67	1.5	1.5	77.90	21	18	248	254	20	70
1	25		3	67	1.5	1.5	81.42	22	19	244	255	21	68
Port	30	10:06					84.925						
6	30	10:06	3	67	1.0	1.0	84.925	22	19	250	255	22	68
5	35		3	67	1.4	1.4	87.27	22	18	250	255	23	68
4	40		3	67	1.4	1.4	91.21	23	18	250	259	22	70
3	45		3	67	1.4	1.4	94.56	23	19	250	255	24	71
2	50		3	67	1.6	1.6	97.02	23	19	250	255	25	69
1	55		3	67	1.4	1.4	101.44	24	20	250	255	25	67
END	60	10:36					104.85						

APEX

Run	Run 3	**Date**	3/4/21
Facility	Arauco	**Time**	10:50
Source Designation	BH-13		
Operator	TMZ		
Filter No.	Run 3		

Barometric Pressure (P_b)	29.7	in Hg
Stack Static Pressure (P_s)	-1.2	in H_2O
Stack Dimensions (Diameter)	37.25	in
Pitot Tube	30	
Meter No.	2	
ΔH at 0.75 cfm	1.83	

Assumed Moisture (B_{ws})	-2			
Nozzle Diameter	0.160	in		
Leak Rate Initial	0.000	ft³/min at	8	in Hg
Leak Rate Final	0.000	ft³/min at	5	in Hg
Traverse Points	12			
Pitot Correction Factor (C_p)	0.84			
Meter Correction Factor (Y)	0.994			
Gas Composition CO_2	0	%		
O_2	21	%		

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	10:50	3	67	1.0	1.0	104.78	21	20	250	255	20	78
5	5		3	67	1.1	1.1	107.63	21	20	245	255	20	74
4	10		3	67	1.6	1.6	110.75	21	20	245	255	20	73
3	15		3	67	1.3	1.3	113.89	22	20	250	255	20	72
2	20		3	67	1.2	1.2	117.50	23	21	250	255	20	72
1	25		3	67	1.2	1.2	120.19	23	21	250	255	20	70
Port	30	11:20					123.761						
6	30	11:25	3	67	0.89	0.89	123.761	23	21	250	254	20	69
5	35		3	67	1.3	1.3	126.58	24	21	250	255	20	69
4	40		4	67	1.4	1.4	129.69	24	21	250	255	20	68
3	45		4	67	1.7	1.7	133.74	25	21	250	255	20	67
2	50		4	67	1.5	1.5	136.77	25	22	250	254	21	67
1	55		4	67	1.2	1.2	140.31	26	22	250	254	21	67
End	60	11:55					143.392						

Moisture Recovery Form for Method 202

Plant	Aravco
Date	3-4-21
Sampling Location	Baghouse 13
Run Number	1
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	BH 13 Run 1
PM Filter Number	20112548
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	488.0	487.4	0.6
2	Empty	0	Modified	641.8	641.8	0.0
CPM Filter						[illegible]
3	Water	100	Modified	664.2 ~~705.1~~	664.1 ~~770.1~~	0.1
4	Silica	200-300	Modified	1002.4	994.2	8.2
				Total Weight Gain (g)		8.9

APEX

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-4-21
Sampling Location	Baghouse 13
Run Number	2
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	BH 13 Run 2
PM Filter Number	20112563
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	498.0	498.0	0.0
2	Empty	0	Modified	659.1	659.0	0.1
CPM Filter						
3	Water	100	Modified	662.3	~~[illegible]~~ 662.2	0.1
4	Silica	200-300	Modified	978.7	973.1	5.6
					Total Weight Gain (g)	5.8

APEX

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-4-21
Sampling Location	Baghouse 13
Run Number	Run 3
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	BH13 Run3
PM Filter Number	20112549
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight		
				Final (g)	Initial (g)	Weight Gain (g)
1	Empty	0	Dropout	487.1	487.1	0.0
2	Empty	0	Modified	642.3	642.3	0.0
CPM Filter						
3	Water	100	Modified	673.1	672.5	0.6
4	Silica	200-300	Modified	1008.5	1002.4	6.1
					Total Weight Gain (g)	6.7

APEX

1.3
.93
38
1170
1209
Kp = 0.93

Run	Run 1
Facility	Arauco
Source Designation	Press
Operator	BH
Filter No.	Run 1
Barometric Pressure (P_b)	30.31 in Hg
Stack Static Pressure (P_s)	+1.2 in H_2O
Stack Dimensions (Diameter)	60 in
Pitot Tube	46
Meter No.	2
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	5
Nozzle Diameter	0.18 in
Leak Rate Initial	0.000 ft^3/min at 14 in Hg
Leak Rate Final	0.000 ft^3/min at 6 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition	CO_2 0 %
	O_2 21 %

Date: 3/5/21
Time: 837

Comment:

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	837	4	86	1.3	1.2	143.470	20	14	250	250	14	65
5	5		4	85	1.3	1.2	146.86	21	20	251	254	24	66
4	10		4	86	1.4	1.3	150.20	23	21	255	256	24	66
3	15		4	86	1.3	1.2	153.60	25	22	254	255	26	66
2	20		4	85	1.2	1.1	156.81	27	23	254	254	26	67
1	25		4	86	1.1	1.0	160.20	30	24	252	253	26	69
Port	30	907					162.60						
6	30	917	4	90	1.1	1.0	162.60	30	24	225	255	31	69
5	35		4	91	1.2	1.1	165.70	30	24	228	255	32	70
4	40		4	92	1.2	1.1	168.80	32	26	238	255	33	70
3	45		4	92	1.3	1.2	172.15	32	26	255	255	33	67
2	50		4	90	1.3	1.2	175.48	34	26	255	255	34	68
1	55		4	90	1.1	1.0	178.52	34	26	256	255	34	68
End	60	947					181.475						

APEX

Kf = 0.93

Run	Run 2
Facility	Arauco
Source Designation	Press
Operator	B4
Filter No.	Run 2
Barometric Pressure (P_b)	30.31 in Hg
Stack Static Pressure (P_s)	+1.2 in H_2O
Stack Dimensions (Diameter)	60 in
Pitot Tube	46
Meter No.	2
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	5
Nozzle Diameter	0.180 in
Leak Rate Initial	0.000 ft³/min at 15 in Hg
Leak Rate Final	0.000 ft³/min at 7 in Hg
Traverse Points	12
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition	CO_2 0 %, O_2 21 %

Date 3/5/21

Time 157

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	957	4	89	1.4	1.3	181.72	32	30	255	256	29	65
5	5		4	96	1.3	1.2	185.15	32	30	254	255	30	65
4	10		4	91	1.3	1.2	188.55	32	30	257	256	31	66
3	15		4	91	1.2	1.1	191.80	33	30	257	255	32	66
2	20	1017/1200	4	91	1.2	1.1	195.10	34	30	257	255	34	66
1	25		4	88	1.2	1.0	197.31	34	30	258	255	34	66
Port	30	1210					201.60						
6	30	1215	4	90	1.2	1.2	201.65	36	34	251	251	30	66
5	35		4	90	1.3	1.2	205.05	38	37	251	255	30	67
4	40		5	90	1.3	1.2	208.45	38	37	257	255	30	67
3	45		5	90	1.2	1.1	211.20	38	37	257	257	30	67
2	50		6	90	1.2	1.1	214.31	38	37	255	255	30	67
1	55		6	90	1.1	1.0	219.25	38	37	256	257	30	67
End	60	1245					218.00						

APEX

Kf=0.93

Run	Run 3	Date	3/5/21
Facility	Arauco	Time	1315
Source Designation	Press		
Operator	RY		
Filter No.	Run 2		

Barometric Pressure (P_b)	30.31	in Hg
Stack Static Pressure (P_s)	1.2	in H_2O
Stack Dimensions (Diameter)	60	in
Pitot Tube	46	
Meter No.	2	
ΔH at 0.75 cfm	1.83	

Assumed Moisture (B_{ws})	5			
Nozzle Diameter	0.180	in		
Leak Rate Initial	0.000	ft³/min at	16	in Hg
Leak Rate Final	0.000	ft³/min at	6	in Hg
Traverse Points	12			
Pitot Correction Factor (C_p)	0.84			
Meter Correction Factor (Y)	0.994			
Gas Composition CO_2	0	%		
O_2	21	%		

Comment

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Train Vacuum (in Hg)	Stack Temp. T_s (°F)	Velocity Press. ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft³)	Dry-Gas Meter Temp. Inlet, T_m (°F)	Dry-Gas Meter Temp. Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxilary Temperature (°F)
6	0	1315	4	87	1.3	1.2	218.10	39	38	251	254	36	66
5	5		4	90	1.3	1.2	221.56	37	37	251	254	37	66
4	10		4	91	1.2	1.1	224.85	38	37	255	255	37	66
3	15		4	90	1.2	1.1	228.26	37	37	254	255	39	67
2	20		4	88	1.1	1.0	231.70	37	37	254	255	40	67
1	25		4	89	1.1	1.0	234.18	37	37	254	255	40	69
Port	30	1345					236.98						
6	30	1355	4	92	1.3	1.2	236.98	38	37	255	255	33	68
5	35		4	91	1.2	1.1	240.27	39	37	254	254	33	66
4	40		4	91	1.2	1.1	243.44	40	37	255	246	34	68
3	45		4	90	1.1	1.0	246.68	40	38	256	246	34	69
2	50		4	92	1.1	1.0	249.75	40	38	251	248	34	69
1	55		4	92	1.1	1.0	252.90	40	38	251	248	35	69
End	60	1425					255.86						

APEX

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-5-21
Sampling Location	Press
Run Number	1
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	Press Run 1
PM Filter Number	20112564
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	507.2	500.3	6.9
2	Empty	0	Modified	666.3	658.7	7.6
CPM Filter						
3	Water	100	Modified	667.2	662.3	4.9
4	Silica	200-300	Modified	986.0	978.7	7.3
					Total Weight Gain (g)	26.7

Moisture Recovery Form for Method 202

APEX

Plant	Arauco
Date	3-5-21
Sampling Location	Press
Run Number	2
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	Press Run 2
PM Filter Number	20112550
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight		
				Final (g)	Initial (g)	Weight Gain (g)
1	Empty	0	Dropout	502.5	488.1	14.4
2	Empty	0	Modified	645.6	642.5	3.1
CPM Filter						
3	Water	100	Modified	673.1	673.1	0.0
4	Silica	200-300	Modified	1018.7	1011.1	7.6
					Total Weight Gain (g)	25.1

APEX

Moisture Recovery Form for Method 202

Plant	Arauco
Date	3-5-21
Sampling Location	Press
Run Number	3
Impinger Box Number	Tan
Recovery Person	MA
Recovery Rinses	water (2), acetone (1), hexane (2)
Sampling Identification	Press Run 3
PM Filter Number	20112565Ø
Comments (sample appearance, odor, color, etc.):	

Impinger Number	Impinger Solution	Amount of Solution (g)	Impinger Tip Configuration	Impinger Weight Final (g)	Impinger Weight Initial (g)	Impinger Weight Weight Gain (g)
1	Empty	0	Dropout	515.8	498.4	
2	Empty	0	Modified	663.8	659.7	
CPM Filter						
3	Water	100	Modified	667.9	667.2	
4	Silica	200-300	Modified	983.0	973.7	
					Total Weight Gain (g)	

Appendix D
Computer-Generated Data Sheets

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	NOx ppmw	VOC ppm	CO ppm
13:53:00	0.2	8.7	5.1
13:54:00	0.2	8.6	5.4
13:55:00	0.2	9.0	5.4
13:56:00	0.2	9.1	5.3
13:57:00	0.2	6.7	5.2
13:58:00	0.2	5.8	5.0
13:59:00	0.2	5.9	4.9
14:00:00	0.2	7.9	4.8
14:01:00	0.2	8.1	4.7
14:02:00	0.2	7.9	4.4
14:03:00	0.2	7.7	4.3
14:04:00	0.2	7.8	4.4
14:05:00	0.2	8.0	4.1
14:06:00	0.2	8.2	4.1
14:07:00	0.2	8.0	4.1
14:08:00	0.2	8.5	4.0
14:09:00	0.2	8.1	3.8
14:10:00	0.2	8.0	3.9
14:11:00	1.8	8.1	4.0
14:12:00	0.2	8.0	3.9
14:13:00	0.2	8.1	-1.6
14:14:00	0.1	8.1	-3.4
14:15:00	0.1	8.0	-3.5
14:16:00	0.1	7.9	-3.8
14:17:00	0.1	7.9	-3.4
14:18:00	0.1	7.9	-3.8
14:19:00	0.1	7.9	-3.7
14:20:00	0.1	7.9	-3.9
14:21:00	0.1	7.8	-3.8
14:22:00	0.1	7.6	-4.0
14:23:00	0.1	7.5	280.7
14:24:00	0.1	7.5	482.0
14:25:00	-0.4	7.5	447.9
14:26:00	-0.3	7.5	448.4
14:27:00	-34.7	7.5	181.6
14:28:00	-92.1	7.4	-2.5
14:29:00	34.2	7.4	-1.8
14:30:00	-50.9	7.4	178.4
14:31:00	0.1	7.2	220.1
14:32:00	0.1	7.1	209.6
14:33:00	185.3	7.1	27.3
14:34:00	461.9	7.1	-4.4
14:35:00	450.1	7.1	-4.7
14:36:00	449.7	7.0	-4.7
14:37:00	393.2	6.9	-4.8

RTO CEMS Data

Arauco North America

Apex Project No. 11020-000020.00

March 2, 2021

Time	NOx ppmw	VOC ppm	CO ppm
14:38:00	220.0	6.8	-4.8
14:39:00	225.1	6.8	-5.0
14:40:00	147.7	6.7	-5.1
14:41:00	89.7	6.6	-5.1
14:42:00	100.6	6.4	-5.1
14:43:00	115.6	6.3	-5.3
14:44:00	225.3	6.2	-5.3
14:45:00	225.4	6.1	-5.4
14:46:00	116.7	6.0	-5.4
14:47:00	100.3	5.9	-5.5
14:48:00	100.9	5.7	-5.5
14:49:00	225.5	5.7	-5.5
14:50:00	196.2	5.6	-5.6
14:51:00	86.0	5.6	-5.6
14:52:00	100.7	5.6	-5.8
14:53:00	56.5	5.7	-6.1
14:54:00	0.3	5.8	-5.9
14:55:00	80.0	5.8	-5.5
14:56:00	101.6	5.6	-5.5
14:57:00	98.5	5.5	-6.1
14:58:00	96.8	5.4	-5.9
14:59:00	101.9	5.3	-5.9
15:00:00	99.1	5.1	-6.0
15:01:00	98.1	5.0	-5.9
15:02:00	101.5	4.9	-6.0
15:03:00	59.6	5.0	-6.4
15:04:00	0.2	4.9	-6.7
15:05:00	0.1	4.8	-6.4
15:06:00	0.1	4.7	-6.4
15:07:00	29.2	4.6	-6.5
15:08:00	46.5	4.4	-6.8
15:09:00	47.0	4.3	-6.6

RTO CEMS Data

Arauco North America

Apex Project No. 11020-000020.00

March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
6:30:00	0.2	-3.3	0.0
6:31:00	0.2	-3.3	0.0
6:32:00	0.2	-3.5	0.0
6:33:00	0.2	7.9	0.0
6:34:00	0.2	108.9	0.0
6:35:00	0.2	196.9	0.0
6:36:00	0.0	200.7	0.0
6:37:00	-0.2	152.9	0.0
6:38:00	-0.2	95.5	0.0
6:39:00	-0.2	99.4	0.0
6:40:00	-0.2	98.8	0.0
6:41:00	-0.2	54.4	1.4
6:42:00	-0.2	-0.6	359.9
6:43:00	-0.2	-2.7	443.8
6:44:00	-0.2	-2.8	449.5
6:45:00	-0.2	-3.0	417.8
6:46:00	-0.2	-2.9	226.3
6:47:00	-0.2	-3.0	224.5
6:48:00	-0.2	-3.1	224.3
6:49:00	0.1	-3.2	43.6
6:50:00	0.3	3.9	0.5
6:51:00	0.1	2.7	0.3
6:52:00	0.1	0.6	0.2
6:53:00	0.1	0.6	0.2
6:54:00	0.1	0.5	0.2
6:55:00	0.1	0.5	0.2
6:56:00	0.1	0.5	0.1
6:57:00	0.1	0.4	0.1
6:58:00	0.1	0.5	0.1
6:59:00	0.1	0.5	0.1
7:00:00	0.1	0.4	0.1
7:01:00	0.1	0.5	0.1
7:02:00	0.1	0.5	0.1
7:03:00	0.1	0.5	0.1
7:04:00	0.1	0.5	0.1
7:05:00	0.1	0.4	0.1
7:06:00	0.5	1.2	0.1
7:07:00	-0.5	33.3	78.3
7:08:00	-0.5	-0.4	139.9
7:09:00	-0.7	-0.2	186.0
7:10:00	-0.7	0.0	224.2
7:11:00	-0.6	11.6	158.8
7:12:00	-0.8	95.1	8.2
7:13:00	-0.8	102.4	0.4
7:14:00	0.1	93.3	1.6

APEX

RTO CEMS Data

Arauco North America

Apex Project No. 11020-000020.00

March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
7:15:00	0.2	14.3	37.0
7:16:00	-0.5	-0.1	0.9
7:17:00	-0.6	-0.8	0.6
7:18:00	-0.1	-0.8	0.5
7:19:00	0.5	-0.8	0.4
7:20:00	26.2	4.0	19.9
7:21:00	28.2	1.9	9.0
7:22:00	42.7	0.6	4.3
7:23:00	28.4	0.0	0.9
7:24:00	25.0	0.2	1.0
7:25:00	15.7	0.7	5.8
7:26:00	15.1	0.2	0.4
7:27:00	8.3	-0.4	6.6
7:28:00	0.3	1.2	8.6
7:29:00	0.2	-0.3	0.2
7:30:00	0.2	-0.4	0.2
7:31:00	13.1	-0.4	0.2
7:32:00	65.0	-0.2	0.5
7:33:00	65.1	-0.3	0.1
7:34:00	65.2	-0.2	0.1
7:35:00	39.0	-0.2	0.9
7:36:00	4.4	8.6	58.4
7:37:00	4.2	11.0	69.9
7:38:00	4.3	16.8	70.3
7:39:00	4.1	11.1	71.6
7:40:00	2.2	6.6	72.2
7:41:00	5.6	12.5	72.8
7:42:00	4.2	14.5	73.3
7:43:00	2.5	10.3	74.0
7:44:00	7.1	15.2	75.2
7:45:00	6.2	13.4	68.6
7:46:00	4.5	7.4	65.8
7:47:00	6.4	9.7	65.7
7:48:00	7.2	13.8	65.1
7:49:00	2.5	11.1	71.3
7:50:00	4.3	12.4	73.3
7:51:00	6.0	15.5	72.0
7:52:00	2.5	10.1	72.6
7:53:00	4.1	8.7	72.8
7:54:00	4.3	15.7	72.8
7:55:00	4.2	13.6	73.1
7:56:00	4.2	9.9	72.5
7:57:00	4.4	16.8	72.6
7:58:00	4.9	11.9	73.0
7:59:00	1.6	65.5	39.4

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
8:00:00	4.3	61.3	31.5
8:01:00	4.6	18.4	72.5
8:02:00	2.5	8.9	74.1
8:03:00	6.0	14.0	74.5
8:04:00	4.3	12.3	75.3
8:05:00	2.3	7.0	74.2
8:06:00	4.6	9.9	73.2
8:07:00	5.5	14.7	72.2
8:08:00	2.4	10.0	72.8
8:09:00	4.2	11.3	72.8
8:10:00	5.8	14.7	72.7
8:11:00	2.3	9.1	73.0
8:12:00	4.0	7.6	72.4
8:13:00	5.0	14.6	71.8
8:14:00	3.6	12.9	72.0
8:15:00	4.0	9.4	71.1
8:16:00	4.4	16.6	70.4
8:17:00	4.2	11.7	70.6
8:18:00	3.1	6.7	70.6
8:19:00	5.3	13.2	71.4
8:20:00	4.5	14.9	71.8
8:21:00	2.6	9.3	71.7
8:22:00	6.1	16.0	70.7
8:23:00	4.5	14.1	71.0
8:24:00	2.6	7.4	71.3
8:25:00	5.0	10.9	71.5
8:26:00	5.8	16.2	71.4
8:27:00	2.6	10.9	71.9
8:28:00	4.3	12.8	71.1
8:29:00	6.1	16.0	71.3
8:30:00	2.5	9.7	72.4
8:31:00	4.1	8.3	72.7
8:32:00	6.1	15.6	72.5
8:33:00	2.9	13.3	71.8
8:34:00	4.3	9.7	70.8
8:35:00	4.6	17.3	70.6
8:36:00	4.3	11.9	72.1
8:37:00	3.2	7.0	72.2
8:38:00	5.7	14.2	71.6
8:39:00	4.6	15.8	70.7
8:40:00	2.7	9.0	70.4
8:41:00	6.1	16.0	70.1
8:42:00	4.6	14.2	68.7
8:43:00	2.7	7.9	68.0
8:44:00	5.3	11.7	68.6

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
8:45:00	5.6	17.3	68.5
8:46:00	3.0	11.5	68.5
8:47:00	4.7	13.4	69.0
8:48:00	6.2	17.3	66.6
8:49:00	2.6	10.2	62.7
8:50:00	4.2	9.5	61.3
8:51:00	6.6	18.5	61.5
8:52:00	3.1	16.0	61.3
8:53:00	4.7	11.9	60.9
8:54:00	4.8	20.4	62.1
8:55:00	4.3	13.6	63.2
8:56:00	3.2	7.7	63.4
8:57:00	5.6	16.1	63.2
8:58:00	4.6	18.0	62.5
8:59:00	2.8	11.0	60.9
9:00:00	5.9	19.2	60.5
9:01:00	4.5	16.8	61.7
9:02:00	2.7	8.6	62.3
9:03:00	5.6	13.3	64.0
9:04:00	6.1	18.9	64.5
9:05:00	3.2	12.3	64.6
9:06:00	5.2	15.1	64.1
9:07:00	6.8	19.0	63.1
9:08:00	3.2	10.7	63.2
9:09:00	5.0	10.3	61.1
9:10:00	7.0	19.8	61.0
9:11:00	3.6	15.9	61.2
9:12:00	5.4	12.4	61.3
9:13:00	5.9	21.2	61.3
9:14:00	4.9	14.4	61.4
9:15:00	4.4	8.2	61.4
9:16:00	6.4	16.8	62.2
9:17:00	5.6	18.4	61.4
9:18:00	3.7	10.7	61.1
9:19:00	7.1	18.8	61.7
9:20:00	5.4	16.7	61.6
9:21:00	3.4	7.9	61.6
9:22:00	6.6	12.8	61.7
9:23:00	5.8	19.0	61.1
9:24:00	3.6	12.1	60.8
9:25:00	5.4	15.6	60.4
9:26:00	6.9	19.7	60.7
9:27:00	3.3	10.4	60.6
9:28:00	9.5	9.5	61.4
9:29:00	11.5	16.6	42.9

APEX

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
9:30:00	3.3	13.9	57.0
9:31:00	5.0	12.8	62.3
9:32:00	5.1	22.2	62.1
9:33:00	4.7	18.7	62.7
9:34:00	2.8	15.0	61.2
9:35:00	6.5	18.0	61.4
9:36:00	4.8	17.3	60.9
9:37:00	3.3	14.6	61.0
9:38:00	6.4	19.4	63.2
9:39:00	4.4	16.7	65.3
9:40:00	3.0	12.0	64.9
9:41:00	5.1	14.2	65.0
9:42:00	5.0	18.9	64.4
9:43:00	4.2	15.5	65.0
9:44:00	2.6	49.7	51.5
9:45:00	1.9	102.3	2.1
9:46:00	1.5	103.7	1.2
9:47:00	1.7	70.9	33.6
9:48:00	1.4	3.9	210.9
9:49:00	1.3	2.0	216.6
9:50:00	1.4	1.9	218.9
9:51:00	7.6	2.9	189.3
9:52:00	14.9	2.5	7.6
9:53:00	7.8	1.6	2.6
9:54:00	0.5	1.9	2.8
9:55:00	0.1	1.2	0.3
9:56:00	4.6	1.6	3.7
9:57:00	14.2	2.4	4.5
9:58:00	5.3	5.2	27.5
9:59:00	1.7	16.3	60.8
10:00:00	4.4	21.0	61.3
10:01:00	4.1	27.4	60.7
10:02:00	1.8	20.9	62.8
10:03:00	3.5	21.6	63.7
10:04:00	3.7	27.4	63.7
10:05:00	3.5	20.3	64.7
10:06:00	3.7	18.8	65.7
10:07:00	4.0	31.6	67.2
10:08:00	3.8	25.9	68.9
10:09:00	3.4	20.6	71.5
10:10:00	4.0	32.6	70.6
10:11:00	3.8	24.4	71.8
10:12:00	1.8	18.8	71.7
10:13:00	6.1	29.9	72.6
10:14:00	5.1	28.5	73.7

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
10:15:00	2.2	20.7	73.8
10:16:00	6.2	28.6	73.5
10:17:00	4.4	25.8	74.2
10:18:00	2.2	19.9	72.0
10:19:00	6.1	23.4	72.9
10:20:00	4.7	30.8	72.8
10:21:00	2.2	22.5	71.1
10:22:00	4.2	22.5	72.3
10:23:00	4.5	29.0	71.0
10:24:00	4.1	20.3	71.4
10:25:00	4.1	17.2	71.5
10:26:00	4.7	31.1	72.1
10:27:00	4.3	26.3	71.2
10:28:00	3.8	19.4	71.8
10:29:00	4.4	31.4	71.6
10:30:00	4.0	25.0	73.4
10:31:00	2.1	18.5	73.8
10:32:00	6.5	30.1	76.9
10:33:00	4.2	31.3	78.2
10:34:00	2.0	20.2	78.5
10:35:00	5.9	27.2	82.4
10:36:00	4.6	25.9	84.3
10:37:00	2.1	19.3	83.9
10:38:00	5.3	21.8	83.9
10:39:00	6.4	30.9	83.3
10:40:00	2.3	22.2	83.2
10:41:00	4.5	21.6	85.2
10:42:00	5.9	29.6	84.4
10:43:00	3.2	21.2	84.7
10:44:00	4.7	17.0	84.8
10:45:00	4.9	30.3	85.6
10:46:00	4.9	24.8	83.8
10:47:00	4.6	17.1	84.0
10:48:00	5.3	29.5	82.9
10:49:00	5.3	23.3	82.8
10:50:00	2.9	16.1	82.3
10:51:00	7.0	26.6	81.9
10:52:00	4.9	25.5	81.9
10:53:00	2.4	17.3	81.5
10:54:00	6.9	29.5	82.2
10:55:00	5.0	25.6	81.3
10:56:00	2.5	18.9	80.0
10:57:00	5.2	20.6	82.6
10:58:00	6.4	28.8	82.8
10:59:00	2.3	20.8	81.9

APEX

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
11:00:00	4.9	20.4	82.2
11:01:00	12.6	19.0	47.7
11:02:00	15.1	1.9	3.4
11:03:00	10.1	1.8	1.8
11:04:00	0.6	2.4	1.9
11:05:00	1.1	1.7	2.0
11:06:00	-0.2	3.4	161.7
11:07:00	-0.4	1.5	219.3
11:08:00	-0.1	-3.3	220.4
11:09:00	-0.4	74.2	69.3
11:10:00	-0.5	101.3	0.5
11:11:00	0.3	93.2	0.0
11:12:00	1.1	18.9	60.1
11:13:00	5.7	28.2	78.3
11:14:00	3.8	25.3	79.4
11:15:00	1.0	14.9	80.7
11:16:00	5.0	18.5	84.5
11:17:00	4.1	29.8	85.4
11:18:00	0.9	17.5	84.8
11:19:00	2.9	20.6	85.8
11:20:00	5.4	22.8	85.6
11:21:00	1.0	18.3	84.7
11:22:00	3.1	12.0	86.6
11:23:00	3.9	28.1	87.5
11:24:00	3.7	20.4	88.1
11:25:00	3.5	10.9	87.9
11:26:00	4.3	24.1	88.4
11:27:00	4.0	19.3	85.8
11:28:00	1.6	8.8	81.9
11:29:00	5.7	18.8	79.7
11:30:00	3.8	22.4	76.8
11:31:00	1.3	9.9	75.4
11:32:00	5.3	18.4	72.9
11:33:00	3.8	18.6	71.5
11:34:00	1.4	8.6	71.1
11:35:00	3.9	11.7	69.4
11:36:00	5.4	21.6	68.4
11:37:00	1.4	11.8	68.4
11:38:00	3.5	13.7	67.3
11:39:00	5.7	22.7	65.9
11:40:00	1.3	14.1	66.2
11:41:00	2.9	10.7	66.4
11:42:00	4.0	27.4	65.7
11:43:00	3.0	22.3	66.2
11:44:00	3.0	13.0	66.8

APEX

RTO CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 2, 2021

Time	VOC ppmw	CO ppm	NOx ppm
11:45:00	3.6	26.6	66.5
11:46:00	3.2	20.1	66.2
11:47:00	1.2	10.6	67.6
11:48:00	5.1	23.8	68.7
11:49:00	3.1	26.2	68.7
11:50:00	1.0	11.6	69.9
11:51:00	5.0	21.7	70.6
11:52:00	3.1	22.1	70.0
11:53:00	1.2	11.1	70.7
11:54:00	4.2	16.6	72.7
11:55:00	4.1	27.8	72.2
11:56:00	1.1	14.5	70.7
11:57:00	3.4	16.1	69.6
11:58:00	5.3	25.4	68.7
11:59:00	1.1	14.1	68.5
12:00:00	2.8	11.2	69.4
12:01:00	5.0	28.0	68.7
12:02:00	1.3	20.2	68.2
12:03:00	2.7	11.0	67.1
12:04:00	3.2	23.7	65.8
12:05:00	3.1	18.2	65.4
12:06:00	1.2	9.2	66.3
12:07:00	5.2	22.2	67.3
12:08:00	3.0	24.7	67.3
12:09:00	0.9	10.8	68.0
12:10:00	4.9	21.1	69.0
12:11:00	3.2	22.0	67.8
12:12:00	1.0	11.0	66.9
12:13:00	3.9	17.1	66.0
12:14:00	2.3	54.8	55.8
12:15:00	0.7	100.3	2.8
12:16:00	0.4	101.6	0.8
12:17:00	0.3	69.8	26.1
12:18:00	-0.1	-0.7	207.9
12:19:00	-0.2	-2.9	218.8
12:20:00	0.3	-2.9	219.0
12:21:00	0.0	0.3	76.3
12:22:00	0.1	-3.3	0.2
12:23:00	0.1	-3.5	-0.2
12:24:00	0.1	-3.6	-0.3
12:25:00	4.9	-2.9	2.6
12:26:00	14.3	-1.8	5.8
12:27:00	15.0	-3.3	-0.3
12:28:00	14.2	-3.5	-0.4

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
6:11:00	0.1
6:12:00	0.1
6:13:00	0.1
6:14:00	1.1
6:15:00	3.2
6:16:00	2.0
6:17:00	0.1
6:18:00	-0.1
6:19:00	-0.1
6:20:00	-0.3
6:21:00	-0.4
6:22:00	-0.3
6:23:00	0.2
6:24:00	0.1
6:25:00	0.1
6:26:00	-0.1
6:27:00	-0.1
6:28:00	-0.1
6:29:00	0.0
6:30:00	-0.1
6:31:00	-0.1
6:32:00	-0.1
6:33:00	0.8
6:34:00	0.5
6:35:00	0.3
6:36:00	0.4
6:37:00	0.2
6:38:00	0.3
6:39:00	0.4
6:40:00	0.2
6:41:00	0.2
6:42:00	40.7
6:43:00	14.4
6:44:00	0.1
6:45:00	0.1
6:46:00	47.6
6:47:00	50.1
6:48:00	36.9
6:49:00	25.2
6:50:00	18.8
6:51:00	21.4
6:52:00	42.5
6:53:00	34.4
6:54:00	25.1
6:55:00	25.1

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
6:56:00	14.9
6:57:00	15.1
6:58:00	9.2
6:59:00	1.6
7:00:00	1.5
7:01:00	1.4
7:02:00	11.1
7:03:00	12.5
7:04:00	12.6
7:05:00	12.5
7:06:00	12.5
7:07:00	12.4
7:08:00	12.4
7:09:00	12.3
7:10:00	12.1
7:11:00	12.0
7:12:00	12.1
7:13:00	12.3
7:14:00	12.4
7:15:00	12.4
7:16:00	12.3
7:17:00	12.1
7:18:00	12.1
7:19:00	12.2
7:20:00	12.3
7:21:00	12.3
7:22:00	12.4
7:23:00	12.4
7:24:00	12.5
7:25:00	12.5
7:26:00	12.4
7:27:00	12.4
7:28:00	12.4
7:29:00	12.3
7:30:00	12.2
7:31:00	12.2
7:32:00	12.6
7:33:00	13.1
7:34:00	13.4
7:35:00	13.4
7:36:00	12.9
7:37:00	12.8
7:38:00	12.7
7:39:00	12.5
7:40:00	12.6

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
7:41:00	12.7
7:42:00	12.6
7:43:00	12.6
7:44:00	12.5
7:45:00	12.4
7:46:00	11.8
7:47:00	11.2
7:48:00	10.9
7:49:00	10.7
7:50:00	10.9
7:51:00	11.3
7:52:00	11.7
7:53:00	11.8
7:54:00	11.7
7:55:00	11.7
7:56:00	12.0
7:57:00	12.2
7:58:00	12.4
7:59:00	12.4
8:00:00	12.1
8:01:00	11.9
8:02:00	11.9
8:03:00	11.9
8:04:00	12.0
8:05:00	12.0
8:06:00	12.0
8:07:00	12.0
8:08:00	12.0
8:09:00	12.1
8:10:00	11.9
8:11:00	11.9
8:12:00	11.8
8:13:00	11.7
8:14:00	11.7
8:15:00	11.8
8:16:00	11.9
8:17:00	11.9
8:18:00	11.8
8:19:00	11.8
8:20:00	11.9
8:21:00	12.1
8:22:00	9.8
8:23:00	18.9
8:24:00	14.9
8:25:00	14.9

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
8:26:00	14.8
8:27:00	5.0
8:28:00	-0.2
8:29:00	-0.3
8:30:00	10.5
8:31:00	12.4
8:32:00	12.4
8:33:00	12.4
8:34:00	12.4
8:35:00	12.6
8:36:00	12.7
8:37:00	12.8
8:38:00	12.9
8:39:00	12.9
8:40:00	13.0
8:41:00	13.0
8:42:00	12.9
8:43:00	12.9
8:44:00	12.9
8:45:00	13.0
8:46:00	13.0
8:47:00	13.1
8:48:00	13.2
8:49:00	13.1
8:50:00	13.1
8:51:00	13.0
8:52:00	13.0
8:53:00	12.8
8:54:00	12.8
8:55:00	12.7
8:56:00	12.7
8:57:00	12.7
8:58:00	12.9
8:59:00	13.0
9:00:00	13.0
9:01:00	13.1
9:02:00	13.1
9:03:00	13.0
9:04:00	13.0
9:05:00	13.0
9:06:00	12.9
9:07:00	13.0
9:08:00	13.1
9:09:00	13.2
9:10:00	13.3

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
9:11:00	13.2
9:12:00	13.2
9:13:00	13.2
9:14:00	13.2
9:15:00	13.3
9:16:00	13.3
9:17:00	13.2
9:18:00	13.2
9:19:00	13.3
9:20:00	13.5
9:21:00	13.8
9:22:00	13.9
9:23:00	13.9
9:24:00	13.7
9:25:00	13.7
9:26:00	13.7
9:27:00	13.7
9:28:00	13.8
9:29:00	13.9
9:30:00	14.0
9:31:00	13.9
9:32:00	13.9
9:33:00	14.0
9:34:00	13.9
9:35:00	14.0
9:36:00	14.2
9:37:00	14.2
9:38:00	14.3
9:39:00	14.3
9:40:00	14.2
9:41:00	14.3
9:42:00	14.2
9:43:00	13.8
9:44:00	13.3
9:45:00	13.3
9:46:00	13.5
9:47:00	1.5
9:48:00	-0.1
9:49:00	-0.2
9:50:00	10.6
9:51:00	15.1
9:52:00	14.9
9:53:00	14.2
9:54:00	14.5
9:55:00	14.5

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
9:56:00	14.6
9:57:00	14.6
9:58:00	14.7
9:59:00	14.7
10:00:00	14.8
10:01:00	14.7
10:02:00	14.7
10:03:00	14.8
10:04:00	14.7
10:05:00	14.7
10:06:00	14.8
10:07:00	14.9
10:08:00	15.1
10:09:00	15.1
10:10:00	15.1
10:11:00	15.1
10:12:00	15.1
10:13:00	15.2
10:14:00	15.3
10:15:00	15.3
10:16:00	15.3
10:17:00	15.3
10:18:00	15.2
10:19:00	15.3
10:20:00	15.4
10:21:00	15.5
10:22:00	15.5
10:23:00	15.4
10:24:00	15.3
10:25:00	15.3
10:26:00	15.4
10:27:00	15.5
10:28:00	15.8
10:29:00	15.8
10:30:00	15.8
10:31:00	15.7
10:32:00	15.7
10:33:00	15.6
10:34:00	15.6
10:35:00	15.6
10:36:00	15.6
10:37:00	15.4
10:38:00	15.4
10:39:00	15.5
10:40:00	15.5

BH11 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 3, 2021

Time	VOC ppmw
10:41:00	15.4
10:42:00	15.3
10:43:00	15.3
10:44:00	15.3
10:45:00	15.4
10:46:00	15.4
10:47:00	15.5
10:48:00	15.5
10:49:00	15.5
10:50:00	15.4
10:51:00	15.5
10:52:00	15.6
10:53:00	15.7
10:54:00	15.7
10:55:00	15.3
10:56:00	15.2
10:57:00	15.2
10:58:00	15.3
10:59:00	15.6
11:00:00	13.9
11:01:00	14.9
11:02:00	14.9
11:03:00	10.0
11:04:00	-0.1
11:05:00	-0.2

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
7:15:00	0.0
7:16:00	2.4
7:17:00	43.5
7:18:00	42.4
7:19:00	32.6
7:20:00	24.9
7:21:00	18.2
7:22:00	14.8
7:23:00	11.2
7:24:00	1.1
7:25:00	1.0
7:26:00	1.0
7:27:00	1.0
7:28:00	1.0
7:29:00	1.0
7:30:00	1.0
7:31:00	1.0
7:32:00	1.0
7:33:00	1.0
7:34:00	1.0
7:35:00	1.0
7:36:00	1.0
7:37:00	1.0
7:38:00	1.0
7:39:00	1.0
7:40:00	1.0
7:41:00	1.0
7:42:00	1.0
7:43:00	1.0
7:44:00	4.9
7:45:00	6.7
7:46:00	6.8
7:47:00	6.8
7:48:00	6.8
7:49:00	6.8
7:50:00	6.8
7:51:00	6.8
7:52:00	6.8
7:53:00	12.2
7:54:00	12.4
7:55:00	6.7
7:56:00	6.7
7:57:00	6.8
7:58:00	6.8
7:59:00	6.8

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
8:00:00	6.7
8:01:00	6.8
8:02:00	6.7
8:03:00	6.7
8:04:00	6.7
8:05:00	6.8
8:06:00	6.8
8:07:00	6.8
8:08:00	6.7
8:09:00	6.7
8:10:00	6.8
8:11:00	6.8
8:12:00	6.7
8:13:00	6.8
8:14:00	6.7
8:15:00	6.7
8:16:00	6.7
8:17:00	6.6
8:18:00	6.6
8:19:00	6.7
8:20:00	6.7
8:21:00	6.7
8:22:00	6.8
8:23:00	6.8
8:24:00	6.7
8:25:00	6.7
8:26:00	6.6
8:27:00	6.6
8:28:00	6.6
8:29:00	6.6
8:30:00	6.7
8:31:00	6.7
8:32:00	6.6
8:33:00	6.5
8:34:00	6.5
8:35:00	6.4
8:36:00	6.4
8:37:00	6.5
8:38:00	6.5
8:39:00	6.5
8:40:00	6.6
8:41:00	6.6
8:42:00	6.6
8:43:00	6.6
8:44:00	6.6

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
8:45:00	6.6
8:46:00	6.7
8:47:00	6.7
8:48:00	6.7
8:49:00	6.7
8:50:00	6.7
8:51:00	6.6
8:52:00	6.6
8:53:00	6.6
8:54:00	6.6
8:55:00	6.6
8:56:00	6.6
8:57:00	6.6
8:58:00	6.6
8:59:00	6.6
9:00:00	6.6
9:01:00	0.9
9:02:00	0.3
9:03:00	0.3
9:04:00	0.2
9:05:00	0.2
9:06:00	11.8
9:07:00	15.1
9:08:00	15.2
9:09:00	7.6
9:10:00	7.2
9:11:00	7.2
9:12:00	7.2
9:13:00	7.2
9:14:00	7.2
9:15:00	7.2
9:16:00	7.3
9:17:00	7.1
9:18:00	6.9
9:19:00	7.0
9:20:00	7.0
9:21:00	7.1
9:22:00	6.8
9:23:00	6.7
9:24:00	6.8
9:25:00	7.0
9:26:00	7.1
9:27:00	7.1
9:28:00	7.1
9:29:00	7.1

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
9:30:00	7.0
9:31:00	7.1
9:32:00	7.1
9:33:00	7.1
9:34:00	7.2
9:35:00	7.2
9:36:00	7.2
9:37:00	7.1
9:38:00	7.1
9:39:00	7.1
9:40:00	7.2
9:41:00	7.2
9:42:00	7.2
9:43:00	7.2
9:44:00	7.2
9:45:00	7.2
9:46:00	7.2
9:47:00	7.2
9:48:00	7.1
9:49:00	7.1
9:50:00	7.2
9:51:00	7.2
9:52:00	7.2
9:53:00	7.1
9:54:00	7.2
9:55:00	7.2
9:56:00	7.2
9:57:00	7.2
9:58:00	7.2
9:59:00	7.3
10:00:00	7.3
10:01:00	7.3
10:02:00	7.4
10:03:00	7.4
10:04:00	7.4
10:05:00	7.3
10:06:00	7.3
10:07:00	7.3
10:08:00	7.4
10:09:00	7.3
10:10:00	7.3
10:11:00	7.3
10:12:00	7.3
10:13:00	7.3
10:14:00	7.3

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
10:15:00	7.3
10:16:00	7.3
10:17:00	7.3
10:18:00	7.3
10:19:00	7.3
10:20:00	7.4
10:21:00	7.3
10:22:00	7.4
10:23:00	7.3
10:24:00	7.2
10:25:00	7.2
10:26:00	7.2
10:27:00	7.1
10:28:00	7.1
10:29:00	7.0
10:30:00	6.8
10:31:00	9.8
10:32:00	15.2
10:33:00	11.3
10:34:00	0.2
10:35:00	1.4
10:36:00	14.9
10:37:00	8.5
10:38:00	6.3
10:39:00	6.3
10:40:00	6.3
10:41:00	6.3
10:42:00	6.2
10:43:00	6.2
10:44:00	6.2
10:45:00	6.2
10:46:00	6.1
10:47:00	6.2
10:48:00	6.1
10:49:00	6.0
10:50:00	5.9
10:51:00	5.8
10:52:00	5.7
10:53:00	5.6
10:54:00	5.6
10:55:00	5.5
10:56:00	5.5
10:57:00	5.4
10:58:00	5.3
10:59:00	5.2

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
11:00:00	5.1
11:01:00	5.0
11:02:00	4.9
11:03:00	4.9
11:04:00	4.7
11:05:00	4.7
11:06:00	4.6
11:07:00	4.5
11:08:00	4.5
11:09:00	4.4
11:10:00	4.4
11:11:00	4.3
11:12:00	4.6
11:13:00	4.5
11:14:00	5.2
11:15:00	5.3
11:16:00	5.3
11:17:00	5.3
11:18:00	5.2
11:19:00	5.1
11:20:00	5.1
11:21:00	5.0
11:22:00	4.9
11:23:00	4.8
11:24:00	4.8
11:25:00	4.8
11:26:00	4.7
11:27:00	4.7
11:28:00	4.6
11:29:00	4.6
11:30:00	4.7
11:31:00	4.6
11:32:00	4.5
11:33:00	4.6
11:34:00	4.6
11:35:00	4.5
11:36:00	4.5
11:37:00	4.6
11:38:00	4.6
11:39:00	4.7
11:40:00	4.7
11:41:00	4.8
11:42:00	4.9
11:43:00	5.0
11:44:00	5.1

BH13 CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 4, 2021

Time	VOC ppmw
11:45:00	5.1
11:46:00	5.1
11:47:00	5.2
11:48:00	5.3
11:49:00	5.4
11:50:00	3.6
11:51:00	0.0
11:52:00	0.2
11:53:00	14.9
11:54:00	15.6

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
7:06:00	0.0	0.4	-0.6
7:07:00	0.0	0.4	-0.7
7:08:00	26.4	0.5	-0.5
7:09:00	50.3	0.5	-0.4
7:10:00	50.0	0.4	-0.4
7:11:00	42.8	0.4	-0.4
7:12:00	23.4	0.5	-0.5
7:13:00	24.8	0.4	-0.5
7:14:00	15.2	0.4	13.1
7:15:00	0.3	0.3	49.6
7:16:00	0.0	0.4	50.4
7:17:00	0.0	0.4	32.9
7:18:00	0.0	0.2	24.6
7:19:00	0.0	0.2	24.8
7:20:00	0.0	0.6	18.9
7:21:00	0.1	1.4	17.6
7:22:00	0.0	-0.8	25.0
7:23:00	0.0	-0.8	24.8
7:24:00	13.8	-0.9	11.5
7:25:00	24.7	-0.9	0.1
7:26:00	24.7	-1.0	-0.1
7:27:00	17.8	-0.9	-0.3
7:28:00	0.1	0.0	-0.4
7:29:00	0.0	24.4	-0.4
7:30:00	0.3	79.6	0.0
7:31:00	0.1	47.2	0.0
7:32:00	0.0	30.4	-0.2
7:33:00	0.0	34.3	-0.3
7:34:00	0.0	50.4	-0.2
7:35:00	0.0	32.1	-0.2
7:36:00	0.1	1.8	-0.1
7:37:00	0.1	1.7	0.0
7:38:00	0.1	1.7	0.0
7:39:00	0.1	1.5	-0.1
7:40:00	0.1	1.5	-0.1
7:41:00	0.1	2.0	-0.1
7:42:00	0.0	1.5	-0.1
7:43:00	0.1	1.5	-0.1
7:44:00	0.0	1.4	-0.1
7:45:00	0.1	1.5	-0.1
7:46:00	0.1	1.6	-0.2
7:47:00	0.0	1.6	-0.1
7:48:00	0.1	1.5	-0.1
7:49:00	0.0	1.5	-0.2
7:50:00	0.0	1.7	-0.1

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
7:51:00	0.0	1.5	-0.1
7:52:00	0.0	1.4	-0.1
7:53:00	0.0	1.5	-0.1
7:54:00	0.0	1.6	-0.2
7:55:00	0.0	1.6	-0.1
7:56:00	0.0	1.5	-0.2
7:57:00	0.0	1.4	-0.1
7:58:00	0.0	1.5	-0.1
7:59:00	0.0	1.5	-0.1
8:00:00	0.0	1.5	-0.1
8:01:00	0.0	1.5	-0.1
8:02:00	0.1	1.5	-0.1
8:03:00	0.0	1.5	-0.1
8:04:00	0.1	1.7	-0.1
8:05:00	0.0	1.5	-0.1
8:06:00	0.0	1.5	-0.1
8:07:00	0.0	1.6	-0.1
8:08:00	0.0	1.7	-0.1
8:09:00	0.0	1.7	-0.1
8:10:00	0.0	1.7	-0.1
8:11:00	0.0	1.6	-0.1
8:12:00	0.1	1.5	-0.1
8:13:00	0.1	1.7	-0.2
8:14:00	0.1	1.6	-0.2
8:15:00	0.1	1.7	-0.1
8:16:00	0.1	1.5	-0.1
8:17:00	0.1	46.2	0.5
8:18:00	0.0	6.6	0.0
8:19:00	0.1	1.6	-0.1
8:20:00	0.1	1.7	-0.1
8:21:00	0.1	1.6	-0.1
8:22:00	0.1	1.6	-0.1
8:23:00	0.1	1.6	-0.1
8:24:00	0.1	1.6	-0.2
8:25:00	0.1	1.6	-0.1
8:26:00	0.1	1.6	-0.1
8:27:00	0.1	6.5	-0.2
8:28:00	0.9	44.3	1.9
8:29:00	1.5	46.1	3.9
8:30:00	1.6	46.5	3.9
8:31:00	1.6	46.7	3.9
8:32:00	1.6	46.6	3.9
8:33:00	1.6	46.8	3.9
8:34:00	3.2	47.5	3.9
8:35:00	8.2	47.5	3.9

APEX

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
8:36:00	11.5	48.1	3.9
8:37:00	13.5	38.9	3.9
8:38:00	29.7	1.6	1.6
8:39:00	32.9	1.0	-0.4
8:40:00	20.3	15.4	0.1
8:41:00	5.1	1.0	0.4
8:42:00	22.4	1.9	-0.5
8:43:00	0.2	34.4	0.1
8:44:00	1.0	49.3	3.5
8:45:00	1.1	48.7	3.9
8:46:00	1.5	49.1	4.0
8:47:00	2.0	49.8	4.0
8:48:00	2.3	49.3	4.1
8:49:00	2.4	49.5	4.1
8:50:00	2.5	49.5	4.2
8:51:00	2.6	49.2	4.2
8:52:00	2.6	49.0	4.2
8:53:00	2.6	48.7	4.2
8:54:00	2.7	48.7	4.2
8:55:00	2.7	49.0	4.2
8:56:00	2.7	49.2	4.2
8:57:00	2.7	49.5	4.2
8:58:00	2.8	49.5	4.2
8:59:00	2.8	50.0	4.2
9:00:00	2.8	50.1	4.2
9:01:00	2.8	50.3	4.2
9:02:00	2.8	50.2	4.3
9:03:00	2.8	50.7	4.3
9:04:00	2.8	51.1	4.3
9:05:00	2.8	50.9	4.3
9:06:00	2.7	51.2	4.4
9:07:00	2.7	51.5	4.3
9:08:00	2.7	52.5	4.3
9:09:00	2.7	52.7	4.4
9:10:00	2.7	52.9	4.4
9:11:00	2.7	53.3	4.3
9:12:00	2.6	53.4	4.3
9:13:00	2.6	52.7	4.3
9:14:00	2.6	52.7	4.3
9:15:00	2.5	52.8	4.3
9:16:00	2.5	52.7	4.4
9:17:00	2.4	52.2	4.4
9:18:00	2.4	52.4	4.4
9:19:00	2.4	53.2	4.5
9:20:00	2.4	54.3	4.5

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
9:21:00	2.4	53.8	4.5
9:22:00	2.4	54.1	4.4
9:23:00	2.4	54.4	4.4
9:24:00	2.4	54.1	4.4
9:25:00	2.4	53.7	4.3
9:26:00	2.4	53.5	4.3
9:27:00	2.3	54.1	4.3
9:28:00	2.4	54.2	4.3
9:29:00	2.4	53.8	4.3
9:30:00	2.4	53.7	4.4
9:31:00	2.4	53.4	4.4
9:32:00	2.4	52.9	4.6
9:33:00	2.4	53.2	4.5
9:34:00	2.3	53.6	4.5
9:35:00	2.4	54.4	4.5
9:36:00	2.4	54.6	4.5
9:37:00	2.3	54.3	4.5
9:38:00	2.3	54.3	4.5
9:39:00	2.3	54.1	4.4
9:40:00	2.3	54.3	4.4
9:41:00	2.3	54.2	4.4
9:42:00	2.3	54.4	4.4
9:43:00	2.3	54.9	4.3
9:44:00	2.3	54.9	4.2
9:45:00	2.3	55.0	4.2
9:46:00	2.3	55.1	4.2
9:47:00	2.1	11.2	6.9
9:48:00	0.9	1.7	22.1
9:49:00	-0.2	1.4	25.0
9:50:00	-0.5	1.0	25.1
9:51:00	6.9	3.9	19.0
9:52:00	22.1	0.8	0.9
9:53:00	24.9	0.7	-0.7
9:54:00	24.9	0.7	-0.7
9:55:00	19.5	6.5	-0.5
9:56:00	-0.8	0.6	-0.7
9:57:00	-1.2	0.2	-0.9
9:58:00	-1.3	-0.1	-1.0
9:59:00	-0.4	39.5	-0.6
10:00:00	-1.2	50.1	-0.5
10:01:00	-1.3	40.3	-0.5
10:02:00	-0.9	4.0	0.3
10:03:00	-1.1	31.7	-0.2
10:04:00	0.1	52.4	3.4
10:05:00	0.2	52.3	4.1

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
10:06:00	0.6	52.6	4.2
10:07:00	1.0	52.8	4.2
10:08:00	1.2	52.9	4.3
10:09:00	1.4	52.7	4.3
10:10:00	1.6	52.8	4.4
10:11:00	1.7	53.1	4.3
10:12:00	1.9	53.0	4.5
10:13:00	1.9	52.7	4.4
10:14:00	2.0	53.1	4.6
10:15:00	2.0	53.4	4.7
10:16:00	1.5	11.6	3.5
10:17:00	1.3	5.0	-0.1
10:18:00	21.9	0.9	-0.2
10:19:00	24.9	2.9	-0.4
10:20:00	24.8	3.0	-0.3
10:21:00	24.9	2.4	-0.3
10:22:00	15.8	18.2	0.6
10:23:00	-0.5	21.7	3.7
10:24:00	-0.5	21.5	3.9
10:25:00	-0.3	20.9	3.8
10:26:00	-0.1	20.7	3.9
10:27:00	0.0	19.9	3.8
10:28:00	0.0	19.0	3.8
10:29:00	0.0	18.1	3.8
10:30:00	0.0	17.6	3.8
10:31:00	0.0	16.9	3.9
10:32:00	0.0	16.7	3.9
10:33:00	-0.1	15.8	3.8
10:34:00	-0.1	15.2	3.8
10:35:00	-0.1	14.2	3.8
10:36:00	-0.2	14.4	3.8
10:37:00	-0.4	20.9	1.8
10:38:00	-0.6	20.8	-0.4
10:39:00	-0.2	20.0	-0.6
10:40:00	-0.1	23.5	-0.6
10:41:00	-0.1	21.0	-0.6
10:42:00	0.2	19.6	-0.6
10:43:00	0.2	14.7	-0.6
10:44:00	0.0	11.5	-0.6
10:45:00	0.0	11.9	-0.6
10:46:00	0.0	11.3	-0.7
10:47:00	0.0	10.3	-0.7
10:48:00	0.0	9.3	-0.7
10:49:00	0.0	8.4	-0.6
10:50:00	0.0	8.0	-0.7

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Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
10:51:00	-0.1	7.9	-0.7
10:52:00	0.0	7.5	-0.6
10:53:00	0.0	6.8	-0.7
10:54:00	0.0	6.8	-0.7
10:55:00	0.0	6.6	-0.7
10:56:00	-0.1	5.9	-0.7
10:57:00	0.0	5.6	-0.7
10:58:00	0.0	5.3	-0.7
10:59:00	0.0	5.0	-0.7
11:00:00	0.0	4.8	-0.8
11:01:00	0.0	4.9	-0.8
11:02:00	0.0	4.6	-0.8
11:03:00	0.0	4.5	-0.8
11:04:00	0.0	4.1	-0.8
11:05:00	0.0	3.8	-0.8
11:06:00	0.0	3.6	-0.8
11:07:00	0.0	3.4	-0.8
11:08:00	0.0	3.2	-0.8
11:09:00	0.0	3.1	-0.8
11:10:00	0.0	2.6	-0.8
11:11:00	1.7	2.7	-0.9
11:12:00	44.2	2.8	-0.6
11:13:00	50.0	2.6	-0.6
11:14:00	27.8	2.6	-0.6
11:15:00	23.6	2.6	-0.7
11:16:00	1.4	2.6	-0.7
11:17:00	0.0	2.6	-0.8
11:18:00	0.0	4.5	-0.1
11:19:00	2.8	-0.2	6.8
11:20:00	0.1	-0.6	23.5
11:21:00	3.5	-0.3	21.4
11:22:00	23.9	-0.6	2.4
11:23:00	15.9	4.5	0.2
11:24:00	0.3	5.7	2.2
11:25:00	0.2	5.7	2.3
11:26:00	0.2	5.7	2.3
11:27:00	0.2	5.8	2.3
11:28:00	0.2	5.7	2.3
11:29:00	0.3	5.6	2.3
11:30:00	0.6	3.1	2.3
11:31:00	1.2	-0.4	0.3
11:32:00	0.2	-0.5	-0.6
11:33:00	0.2	-0.5	-0.6
11:34:00	0.1	1.5	-0.5
11:35:00	0.3	3.6	1.8

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Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
11:36:00	0.3	3.8	2.4
11:37:00	0.3	4.0	2.3
11:38:00	0.3	4.1	2.3
11:39:00	0.3	3.6	2.4
11:40:00	0.3	3.2	2.4
11:41:00	0.3	3.6	2.4
11:42:00	0.3	6.1	2.4
11:43:00	0.3	5.8	2.3
11:44:00	0.3	5.6	2.3
11:45:00	0.3	5.5	2.4
11:46:00	0.4	5.5	2.4
11:47:00	0.4	5.5	2.4
11:48:00	0.4	5.5	2.4
11:49:00	0.4	5.4	2.4
11:50:00	0.5	7.7	2.4
11:51:00	0.8	25.1	2.6
11:52:00	1.0	27.7	2.7
11:53:00	1.1	28.9	2.8
11:54:00	1.1	28.9	2.8
11:55:00	1.1	29.3	2.7
11:56:00	1.2	29.6	2.7
11:57:00	1.2	30.1	2.8
11:58:00	1.3	31.1	2.8
11:59:00	1.3	32.0	2.8
12:00:00	1.5	33.7	2.8
12:01:00	1.5	34.6	2.8
12:02:00	1.5	34.7	2.9
12:03:00	1.6	35.1	2.9
12:04:00	1.6	35.4	3.0
12:05:00	1.6	35.8	3.2
12:06:00	1.6	35.8	3.1
12:07:00	1.6	36.4	3.1
12:08:00	1.6	36.7	3.1
12:09:00	1.6	37.3	3.1
12:10:00	1.6	37.3	3.2
12:11:00	1.6	37.5	3.2
12:12:00	1.6	37.7	3.2
12:13:00	1.6	37.7	3.2
12:14:00	1.6	37.4	3.2
12:15:00	1.6	37.6	3.2
12:16:00	1.6	37.8	3.3
12:17:00	1.6	37.6	3.2
12:18:00	1.6	37.5	3.2
12:19:00	1.6	38.0	3.3
12:20:00	1.7	38.2	3.2

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Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
12:21:00	1.7	38.2	3.2
12:22:00	1.7	38.5	3.2
12:23:00	1.7	38.9	3.2
12:24:00	1.7	39.9	3.2
12:25:00	1.8	40.0	3.1
12:26:00	1.8	40.1	3.1
12:27:00	1.8	40.4	3.1
12:28:00	1.8	40.8	3.1
12:29:00	1.8	41.4	3.1
12:30:00	1.9	42.1	3.1
12:31:00	1.9	42.9	3.1
12:32:00	2.0	43.9	3.1
12:33:00	2.0	44.4	3.1
12:34:00	2.0	44.3	3.0
12:35:00	2.0	44.5	3.0
12:36:00	2.0	44.4	3.0
12:37:00	2.1	44.7	3.0
12:38:00	2.1	44.9	3.0
12:39:00	2.1	45.4	3.0
12:40:00	2.1	46.2	3.1
12:41:00	2.2	46.2	3.0
12:42:00	2.2	46.7	3.0
12:43:00	2.2	47.1	2.9
12:44:00	2.2	47.0	3.0
12:45:00	2.2	47.6	2.9
12:46:00	2.2	47.3	2.9
12:47:00	2.3	47.7	2.9
12:48:00	2.3	47.5	2.9
12:49:00	2.3	47.3	2.9
12:50:00	2.3	47.7	2.9
12:51:00	2.3	47.8	2.9
12:52:00	2.1	46.8	2.9
12:53:00	1.0	49.7	-0.1
12:54:00	0.7	13.1	-0.6
12:55:00	0.5	0.1	-0.8
12:56:00	0.4	3.2	1.1
12:57:00	0.3	0.0	20.3
12:58:00	0.2	-0.1	24.9
12:59:00	2.7	1.5	21.7
13:00:00	22.2	-0.1	2.6
13:01:00	25.0	-0.2	-0.5
13:02:00	24.1	15.5	-0.6
13:03:00	4.1	46.1	1.8
13:04:00	1.5	45.9	3.0
13:05:00	1.6	46.1	3.0

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
13:06:00	1.8	45.9	3.0
13:07:00	2.0	45.6	3.0
13:08:00	2.1	45.4	3.0
13:09:00	2.2	45.7	3.0
13:10:00	2.3	46.0	3.0
13:11:00	2.3	46.0	3.0
13:12:00	2.3	46.1	3.1
13:13:00	2.3	46.2	3.0
13:14:00	2.3	46.0	3.0
13:15:00	2.3	45.8	3.0
13:16:00	2.3	46.1	3.0
13:17:00	2.3	46.6	3.0
13:18:00	2.4	46.7	2.9
13:19:00	2.4	46.5	3.0
13:20:00	2.4	46.9	3.0
13:21:00	2.4	46.5	3.0
13:22:00	2.4	46.8	3.0
13:23:00	2.4	46.4	3.0
13:24:00	2.4	46.3	3.0
13:25:00	2.4	46.4	2.9
13:26:00	2.4	46.4	2.9
13:27:00	2.4	46.1	2.9
13:28:00	2.4	46.2	3.0
13:29:00	2.4	46.4	2.9
13:30:00	2.4	46.2	2.9
13:31:00	2.4	46.0	2.9
13:32:00	2.4	46.4	3.0
13:33:00	2.4	46.5	2.9
13:34:00	2.4	46.2	2.9
13:35:00	2.3	47.1	2.9
13:36:00	2.3	47.2	2.9
13:37:00	2.3	47.6	2.9
13:38:00	2.3	47.2	2.8
13:39:00	2.3	47.0	2.9
13:40:00	2.3	46.7	2.9
13:41:00	2.3	47.1	2.9
13:42:00	2.3	46.9	2.9
13:43:00	2.3	46.3	3.0
13:44:00	2.3	46.3	2.9
13:45:00	2.4	46.9	3.0
13:46:00	2.4	46.4	3.0
13:47:00	2.4	46.3	3.0
13:48:00	2.4	45.9	3.0
13:49:00	2.4	45.9	3.0
13:50:00	2.4	45.9	3.0

APEX

Press CEMS Data
Arauco North America
Apex Project No. 11020-000020.00
March 5, 2021

Time	NOx ppm	VOC ppmw	CO ppm
13:51:00	2.4	45.8	3.1
13:52:00	2.3	45.7	3.0
13:53:00	2.3	45.7	3.0
13:54:00	2.3	45.9	3.1
13:55:00	2.3	45.8	3.1
13:56:00	2.3	45.6	3.0
13:57:00	2.3	45.3	3.0
13:58:00	2.3	45.7	3.1
13:59:00	2.3	45.4	3.0
14:00:00	2.3	45.4	3.0
14:01:00	2.3	45.2	3.0
14:02:00	2.3	45.6	3.0
14:03:00	2.3	45.3	3.0
14:04:00	2.3	45.0	3.0
14:05:00	2.3	44.8	3.0
14:06:00	2.3	44.6	3.0
14:07:00	2.3	44.5	2.9
14:08:00	2.3	44.5	3.0
14:09:00	2.3	44.4	3.0
14:10:00	2.3	45.1	3.0
14:11:00	2.2	44.7	3.0
14:12:00	2.2	45.0	3.0
14:13:00	2.2	44.9	3.0
14:14:00	2.2	45.2	3.0
14:15:00	2.2	45.0	3.0
14:16:00	7.2	12.4	3.2
14:17:00	24.4	0.5	0.2
14:18:00	25.3	0.2	-0.6
14:19:00	18.3	1.5	2.1
14:20:00	0.7	0.0	21.4
14:21:00	0.4	-0.1	24.9
14:22:00	0.6	10.3	21.9
14:23:00	0.3	0.0	3.3
14:24:00	0.3	38.9	0.0
14:25:00	0.2	50.2	-0.1
14:26:00	0.2	49.8	-0.6

Run

1

Date Mar 2, 2021
Time 8:59

USEPA Method 2
Gas Velocity Traverse and Volumetric Flowrate

Facility	Arauco North America			**Operators**	TMZ
Sampling Location	RTO			**Pitot Tube**	45
Stack Diameter, in	123	**Area, ft^2**	82.516	**Pitot Tube Factor, C_p**	0.84
Stack Dimension, in	NA	**Port Length, in**		**Cyclonic Flow Check**	<20
Gas Temperature, ˚F WB				**P_{bar}, Bar. Press., in Hg**	28.70
Gas Temperature, ˚F DB				**P_{stat}, Static Press., in H_2O**	-0.7114
% CO_2 3.0		**% CO**	0	**% Moisture, v/v**	20.4
% O_2 17.0		**% N_2**	80	**Molecular Weight, M_d**	29.16
				Molecular Weight, M_s	26.89

Traverse Port	Traverse Point	Velocity Head Difference (ΔP) (in H_2O)	Stack Temperature ˚F	$(\Delta P)^{0.5}$ (in $H_2O)^{0.5}$	Null Angle (zero ΔP angle)	Cosine Null Angle ($\cos \theta_{y(i)}$)	Velocity of Stack Gas V_{ai} (ft/sec)
	6	0.6532	332	0.808	0		
	5	0.5764	333	0.759	0		
	4	0.9071	333	0.952	0		
	3	0.9114	334	0.955	0		
	2	0.5358	333	0.732	0		
	1	0.4200	334	0.648	0		
	6	0.6839	331	0.827	0		
	5	0.6846	333	0.827	0		
	4	0.8275	333	0.910	0		
	3	0.7058	333	0.840	0		
	2	0.6228	333	0.789	0		
	1	0.4715	333	0.687	0		
	6	0.7415	332	0.861	0		
	5	0.8641	334	0.930	0		
	4	0.9252	333	0.962	0		
	3	0.7342	334	0.857	0		
	2	0.4729	334	0.688	0		
	1	0.4246	334	0.652	0		
	6	0.8166	335	0.904	0		
	5	1.046	335	1.023	0		
	4	1.058	336	1.029	0		
	3	1.021	336	1.010	0		
	2	1.122	336	1.059	0		
	1	0.6407	336	0.800	0		
Average		0.7445	334	0.855	0		

Comments

P_s	**28.65**	in Hg
V_s	**3,738**	ft/min
Q_s	**308,414**	cfm
Q_{std}	**196,432**	scfm
Q	**156,414**	dscfm

Facility	Arauco North America
Source Designation	RTO
Test Date	Tuesday, March 2, 2021
Test Run	**Run 1**
Operator	TMZ
Filter No.	20112546
Barometric Pressure (P_b)	28.70 in Hg
Stack Static Pressure (P_s)	-0.7 in H_2O
Stack Dimensions (Diameter)	123
Pitot Tube	45
Meter No.	2
Meter Isokinetic Factor (Kiso)	1.699
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	20 %	
Condensate (V_{lc})	166.1 g	
Silica Gel Weight Gain (V_{lc})	28.9 g	
Nozzle Diameter	0.245 in	
Leak Rate Initial	0.000 ft^3/min at	7 in Hg
Leak Rate Final	0.000 ft^3/min at	6 in Hg
Traverse Points	24	
Pitot Correction Factor (C_p)	0.84	
Meter Correction Factor (Y)	0.994	
Gas Composition (%)		
CO_2	3	
O_2	17	

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	564.3	487.6	76.7
2	692.6	642.5	50.1
3	798.4	759.1	39.3
4	965.9	937.0	28.9

Traverse Point	Sampling Time (minute)	Sampling Time Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	9:45	3	334	0.60	0.98	793.517	38	38	254	255	25	67	794	0.775
5	2.5		3	334	0.57	0.92	794.97	38	38	257	255	26	67	794	0.755
4	5.0		3	334	0.86	1.46	796.41	38	38	255	255	26	67	794	0.927
3	7.5		3	334	0.54	0.88	798.61	38	38	256	255	26	67	794	0.735
2	10.0		3	334	0.58	0.95	799.28	39	38	255	255	26	67	794	0.762
1	12.5		3	334	0.49	0.79	800.38	39	38	255	255	26	67	794	0.700
Port	15.0	10:00	-	-	-	-	801.680	-	-	-	-	-	-		
6	15.0	10:01	3	343	0.88	1.43	801.680	40	38	254	255	25	69	803	0.938
5	17.5		3	344	0.83	1.35	803.35	40	38	254	255	27	71	804	0.911
4	20.0		3	344	1.00	1.63	805.01	40	38	256	255	28	73	804	1.000
3	22.5		3	343	0.87	1.42	806.71	41	38	254	255	33	75	803	0.933
2	25.0		4	335	0.91	1.48	808.06	41	38	256	255	37	77	795	0.954
1	27.5		4	337	0.73	1.19	810.13	41	38	254	255	43	78	797	0.854
Port	30.0	10:16	-	-	-	-	811.710	-	-	-	-	-	-		
6	30.0	10:17	4	337	0.62	1.01	811.710	41	38	254	255	43	77	797	0.787
5	32.5		5	337	0.64	1.10	813.26	42	39	254	256	43	75	797	0.800
4	35.0		5	333	0.72	1.19	815.38	42	39	250	251	45	76	793	0.849
3	37.5		5	333	0.55	0.88	816.30	42	39	250	252	46	77	793	0.742
2	40.0		4	333	0.50	0.82	817.81	44	40	251	252	46	77	793	0.707
1	42.5		4	336	0.43	0.70	819.05	44	40	255	251	47	78	796	0.656
Port	45.0	10:32	-	-	-	-	820.265	-	-	-	-	-	-		
6	45.0	10:34	4	339	0.77	1.25	820.265	45	40	256	256	50	78	799	0.877
5	47.5		4	334	0.86	1.40	821.81	45	40	255	255	50	78	794	0.927
4	50.0		4	333	0.81	1.32	823.61	45	40	255	255	51	78	793	0.900
3	52.5		4	335	1.10	1.79	825.27	46	41	255	255	51	79	795	1.049
2	55.0		4	336	0.98	1.60	827.12	47	41	255	255	51	79	796	0.990
1	57.5		4	340	0.72	1.17	828.98	47	42	256	255	52	80	800	0.849
End	60.0	10:49	-	-	-	-	830.565	-	-	-	-	-	-	797	0.849
Average	60.0		4	337	0.73	1.20	37.048	42	39	254	255	38	74	40.38	

Facility	Arauco North America
Source Designation	RTO
Test Date	Tuesday, March 2, 2021
Test Run	**Run 2**
Operator	TMZ
Filter No.	20112559
Barometric Pressure (P_b)	28.70 in Hg
Stack Static Pressure (P_s)	-0.7 in H_2O
Stack Dimensions (Diameter)	123
Pitot Tube	45
Meter No.	2
Meter Isokinetic Factor (Kiso)	1.741
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	20 %
Condensate (V_{lc})	253.3 g
Silica Gel Weight Gain (V_{lc})	23.7 g
Nozzle Diameter	0.245 in
Leak Rate Initial	0.000 ft^3/min at 4 in Hg
Leak Rate Final	0.000 ft^3/min at 5 in Hg
Traverse Points	24
Pitot Correction Factor (C_p)	0.84
Meter Correction Factor (Y)	0.994
Gas Composition (%)	
CO_2	3
O_2	17

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	608.3	499.0	109.3
2	746.5	658.3	88.2
3	815.5	759.7	55.8
4	927.2	903.5	23.7

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	11:05	3	345	0.67	1.09	830.653	48	43	254	256	26	66	805	0.819
5	2.5		3	341	0.63	1.02	832.25	49	44	257	256	31	71	801	0.794
4	5.0		3	344	0.74	1.21	833.76	50	45	255	255	33	72	804	0.860
3	7.5		3	345	0.86	1.40	834.91	51	45	255	255	35	72	805	0.927
2	10.0		3	345	0.85	1.38	836.92	52	45	255	255	35	72	805	0.922
1	12.5		3	346	0.52	0.89	838.56	53	46	255	255	36	72	806	0.721
Port	15.0	11:20	-	-	-	-	839.900	-	-	-	-	-	-		
6	15.0	11:21	3	348	0.89	1.45	839.900	53	46	256	255	40	73	808	0.943
5	17.5		3	339	1.10	1.79	841.56	52	46	254	255	41	73	799	1.049
4	20.0		3	344	1.00	1.63	843.41	52	47	254	255	41	74	804	1.000
3	22.5		3	347	0.91	1.48	845.02	52	47	252	252	42	74	807	0.954
2	25.0		3	344	0.79	1.28	846.75	51	47	255	255	42	74	804	0.889
1	27.5		3	347	0.72	1.17	848.36	50	47	255	255	43	75	807	0.849
Port	30.0	11:36	-	-	-	-	850.010	-	-	-	-	-	-		
6	30.0	11:37	3	344	0.91	1.48	850.010	49	47	255	255	43	72	804	0.954
5	32.5		3	341	0.71	1.16	851.55	49	47	255	255	43	72	801	0.843
4	35.0		3	337	0.68	1.11	853.10	49	47	254	255	44	71	797	0.825
3	37.5		3	349	0.83	1.35	854.53	48	47	254	255	45	70	809	0.911
2	40.0		3	335	0.74	1.21	856.16	48	47	255	255	47	70	795	0.860
1	42.5		3	347	0.65	1.05	857.72	50	47	256	255	48	70	807	0.806
Port	45.0	11:52	-	-	-	-	859.163	-	-	-	-	-	-		
6	45.0	11:53	3	341	0.85	1.38	859.163	51	47	255	255	50	70	801	0.922
5	47.5		4	331	1.10	1.79	860.80	52	47	255	255	51	70	791	1.049
4	50.0		4	347	1.00	1.60	862.57	53	47	254	255	51	71	807	1.000
3	52.5		4	335	1.00	1.60	864.41	54	47	254	255	52	71	795	1.000
2	55.0		4	339	0.90	1.47	866.12	54	47	254	255	52	72	799	0.949
1	57.5		4	341	0.71	1.16	867.88	54	47	253	255	53	73	801	0.843
End	60.0	12:08	-	-	-	-	869.601	-	-	-	-	-	-	803	0.9036
Average	60.0		3	343	0.82	1.34	38.948	51	46	255	255	43	72	48.67	

Facility	Arauco North America				
Source Designation	RTO				
Test Date	Tuesday, March 2, 2021	**Assumed Moisture (B_{ws})**	20 %		
Test Run	**Run 3**	**Condensate (V_{lc})**	196.4 g		
Operator	TMZ	**Silica Gel Weight Gain (V_{lc})**	14.4 g		
Filter No.	20112547	**Nozzle Diameter**	0.245 in		
Barometric Pressure (P_b)	28.70 in Hg	**Leak Rate Initial**	0.000 ft^3/min at	9 in Hg	
Stack Static Pressure (P_s)	-0.7 in H_2O	**Leak Rate Final**	0.000 ft^3/min at	7 in Hg	
Stack Dimensions (Diameter)	123	**Traverse Points**	24		
Pitot Tube	45	**Pitot Correction Factor (C_p)**	0.84		
Meter No.	2	**Meter Correction Factor (Y)**	0.994		
Meter Isokinetic Factor (Kiso)	1.704	**Gas Composition (%)**			
ΔH at 0.75 cfm	1.83	**CO_2**	3		
		O_2	17		

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	590.8	487.0	103.8
2	708.1	642.0	66.1
3	824.7	798.2	26.5
4	914.8	900.4	14.4

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	12:16	5	350	0.97	1.50	869.750	48	48	253	257	41	67	810	0.983
5	2.5		5	349	0.88	1.41	871.40	48	48	256	256	35	68	809	0.938
4	5.0		5	349	0.86	1.38	873.00	49	48	255	255	37	75	809	0.927
3	7.5		5	346	0.98	1.60	874.60	51	47	254	256	39	83	806	0.990
2	10.0		5	332	0.77	1.25	876.34	53	48	255	255	41	82	792	0.877
1	12.5		5	336	0.74	1.20	878.03	52	47	254	255	42	81	796	0.860
Port	15.0	12:31	-	-	-	-	879.831	-	-	-	-	-	-		
6	15.0	12:33	5	342	0.70	1.12	879.831	52	47	255	255	45	80	802	0.837
5	17.5		5	340	0.58	0.95	881.20	52	47	255	255	47	82	800	0.762
4	20.0		5	339	0.73	1.19	882.54	51	47	255	255	48	79	799	0.854
3	22.5		5	331	0.72	1.17	884.16	50	48	256	255	48	74	791	0.849
2	25.0		5	339	0.56	0.91	885.77	50	48	256	255	48	73	799	0.748
1	27.5		5	335	0.51	0.83	887.19	48	47	255	256	48	72	795	0.714
Port	30.0	12:48	-	-	-	-	888.491	-	-	-	-	-	-		
6	30.0	12:49	5	339	0.67	1.04	888.491	47	46	255	255	47	71	799	0.819
5	32.5		5	341	0.69	1.12	890.00	46	46	256	255	47	71	801	0.831
4	35.0		5	340	0.68	1.11	891.52	46	46	255	255	47	71	800	0.825
3	37.5		5	342	0.81	1.32	892.47	46	46	254	255	46	74	802	0.900
2	40.0		5	334	0.60	0.98	894.66	46	46	255	255	47	77	794	0.775
1	42.5		5	334	0.58	0.99	896.14	46	46	256	256	47	77	794	0.762
Port	45.0	13:04	-	-	-	-	897.521	-	-	-	-	-	-		
6	45.0	13:05	5	342	0.93	1.52	897.521	45	45	255	254	48	68	802	0.964
5	47.5		5	337	1.00	1.63	898.49	43	44	256	255	48	72	797	1.000
4	50.0		5	335	1.10	1.80	900.97	43	41	254	256	48	72	795	1.049
3	52.5		5	334	1.10	1.80	902.91	43	44	258	255	48	72	794	1.049
2	55.0		5	340	0.94	1.53	904.70	43	43	256	255	49	73	800	0.970
1	57.5		5	343	0.67	1.09	906.43	43	43	256	255	50	73	803	0.819
End	60.0	13:20	-	-	-	-	908.733	-	-	-	-	-	-	800	0.879
Average	60.0		5	340	0.78	1.27	38.983	48	46	255	255	45	74	46.81	

Facility	Arauco North America				
Source Designation	BH11				
Test Date	Wednesday, March 3, 2021	**Assumed Moisture (B_{ws})**	3 %		
Test Run	**Run 1**	**Condensate (V_{lc})**	0.7 g		
Operator	BY	**Silica Gel Weight Gain (V_{lc})**	7.7 g		
Filter No.	20112560	**Nozzle Diameter**	0.180 in		
Barometric Pressure (P_b)	29.88 in Hg	**Leak Rate Initial**	0.000 ft^3/min at	12 in Hg	
Stack Static Pressure (P_s)	1.1 in H_2O	**Leak Rate Final**	0.000 ft^3/min at	6 in Hg	
Stack Dimensions **(Diameter)**	49.25	**Traverse Points**	12		
Pitot Tube	5ftA	**Pitot Correction Factor (C_p)**	0.84		
Meter No.	2	**Meter Correction Factor (Y)**	0.994		
Meter Isokinetic Factor (Kiso)	0.972	**Gas Composition (%)**			
ΔH at 0.75 cfm	1.83	**CO_2**	0		
		O_2	21		

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	498.3	498.2	0.1
2	659.1	659.1	0.0
3	760.6	760.0	0.6
4	962.6	954.9	7.7

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	7:22	5	81	1.5	1.5	908.240	26	26	251	255	26	65	541	1.225
5	5.0		5	81	1.6	1.6	911.90	27	25	252	256	28	65	541	1.265
4	10.0		4	81	1.4	1.4	915.10	27	25	252	255	31	67	541	1.183
3	15.0		4	81	1.4	1.4	918.40	28	26	252	255	32	67	541	1.183
2	20.0		3	81	1.3	1.3	921.12	28	26	251	255	33	69	541	1.140
1	25.0		3	81	1.2	1.2	924.90	28	26	256	256	34	70	541	1.095
Port	30.0	7:52	-	-	-	-	927.950	-	-	-	-	-	-		
6	30.0	7:55	4	80	1.4	1.4	927.950	31	26	251	254	38	70	540	1.183
5	35.0		4	80	1.5	1.5	931.06	32	27	250	255	39	70	540	1.225
4	40.0		4	81	1.6	1.6	934.44	32	27	254	255	39	68	541	1.265
3	45.0		4	81	1.2	1.2	938.00	33	27	255	256	39	68	541	1.095
2	50.0		4	81	1.1	1.1	941.05	33	27	255	255	39	68	541	1.049
1	55.0		3	81	1.1	1.1	943.90	33	27	254	255	39	69	541	1.049
End	60.0	8:25	-	-	-	-	946.225	-	-	-	-	-	-	541	1.163
Average	60.0		4	81	1.4	1.4	37.985	30	26	253	255	35	68	28.04	

Facility	Arauco North America				
Source Designation	BH11				
Test Date	Wednesday, March 3, 2021	**Assumed Moisture (B_{ws})**	3 %		
Test Run	**Run 2**	**Condensate (V_{lc})**	1.0 g		
Operator	BY	**Silica Gel Weight Gain (V_{lc})**	10.1 g		
Filter No.	20112562	**Nozzle Diameter**	0.180 in		
Barometric Pressure (P_b)	29.88 in Hg	**Leak Rate Initial**	0.000 ft^3/min at	13 in Hg	
Stack Static Pressure (P_s)	1.1 in H_2O	**Leak Rate Final**	0.000 ft^3/min at	7 in Hg	
Stack Dimensions **(Diameter)**	49.25	**Traverse Points**	12		
Pitot Tube	5ftA	**Pitot Correction Factor (C_p)**	0.84		
Meter No.	2	**Meter Correction Factor (Y)**	0.994		
Meter Isokinetic Factor (Kiso)	0.981	**Gas Composition (%)**			
ΔH at 0.75 cfm	1.83	**CO_2**	0		
		O_2	21		

APEX

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	487.3	487.3	0.0
2	642.1	642.1	0.0
3	777.3	776.3	1.0
4	994.2	984.1	10.1

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	8:43	4	81	1.2	1.2	946.870	31	29	244	256	37	65	541	1.095
5	5.0		4	81	1.3	1.3	949.65	31	29	250	255	38	66	541	1.140
4	10.0		4	82	1.4	1.4	952.40	33	29	257	255	38	67	542	1.183
3	15.0		4	83	1.3	1.3	955.37	35	29	256	255	37	68	543	1.140
2	20.0		4	83	1.1	1.1	958.51	36	29	255	255	37	68	543	1.049
1	25.0		4	83	1.1	1.1	961.53	36	30	255	256	38	69	543	1.049
Port	30.0	9:13	-	-	-	-	964.530	-	-	-	-	-	-		
6	30.0	9:15	4	83	1.3	1.3	964.530	37	30	252	252	39	71	543	1.140
5	35.0		4	82	1.4	1.4	967.80	37	30	253	252	39	73	542	1.183
4	40.0		4	82	1.5	1.5	971.10	39	31	253	255	39	73	542	1.225
3	45.0		4	82	1.4	1.4	974.25	40	33	255	255	40	75	542	1.183
2	50.0		4	82	1.2	1.2	978.02	40	33	256	254	40	76	542	1.095
1	55.0		4	82	1.1	1.1	981.15	41	34	251	255	40	76	542	1.049
End	60.0	9:45	-	-	-	-	984.181	-	-	-	-	-	-	542	1.1277
Average	60.0		4	82	1.3	1.3	37.311	36	31	253	255	39	71	33.42	

Facility	Arauco North America		
Source Designation	BH11		
Test Date	Wednesday, March 3, 2021	**Assumed Moisture (B_{ws})**	3 %
Test Run	**Run 3**	**Condensate (V_{lc})**	0.4 g
Operator	BY	**Silica Gel Weight Gain (V_{lc})**	10.5 g
Filter No.	20112561	**Nozzle Diameter**	0.180 in
Barometric Pressure (P_b)	29.88 in Hg	**Leak Rate Initial**	0.000 ft^3/min at 11 in Hg
Stack Static Pressure (P_s)	1.1 in H_2O	**Leak Rate Final**	0.000 ft^3/min at 5 in Hg
Stack Dimensions (Diameter)	49.25	**Traverse Points**	12
Pitot Tube	5ftA	**Pitot Correction Factor (C_p)**	0.84
Meter No.	2	**Meter Correction Factor (Y)**	0.994
Meter Isokinetic Factor (Kiso)	0.996	**Gas Composition (%)**	
ΔH at 0.75 cfm	1.83	**CO_2**	0
		O_2	21

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	498.1	498.1	0.0
2	659.1	659.0	0.1
3	760.9	760.6	0.3
4	973.1	962.6	10.5

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	10:00	4	82	1.5	1.5	984.300	40	37	251	256	39	66	542	1.225
5	5.0		4	82	1.6	1.6	987.80	42	37	250	251	40	68	542	1.265
4	10.0		4	82	1.6	1.6	991.45	43	37	251	252	41	69	542	1.265
3	15.0		4	82	1.3	1.3	995.05	45	38	252	253	41	70	542	1.140
2	20.0		4	82	1.2	1.2	998.35	46	39	252	253	41	71	542	1.095
1	25.0		4	82	1.2	1.2	1,001.16	46	39	255	253	42	71	542	1.095
Port	30.0	10:30	-	-	-	-	1,004.920	-	-	-	-	-	-		
6	30.0	10:34	4	83	1.2	1.2	1,004.920	47	39	255	255	44	68	543	1.095
5	35.0		4	83	1.4	1.4	1,008.25	48	39	256	254	45	69	543	1.183
4	40.0		4	82	1.4	1.4	1,011.70	48	40	250	254	49	72	542	1.183
3	45.0		4	82	1.2	1.2	1,015.15	48	41	251	256	50	74	542	1.095
2	50.0		4	82	1.1	1.1	1,018.40	50	42	251	253	52	76	542	1.049
1	55.0		4	82	1.1	1.1	1,021.62	52	44	252	253	55	76	542	1.049
End	60.0	11:04	-	-	-	-	1,024.650	-	-	-	-	-	-	542	1.145
Average	60.0		4	82	1.3	1.3	40.350	46	39	252	254	45	71	42.79	

Facility	Arauco North America
Source Designation	BH13
Test Date	Thursday, March 4, 2021
Test Run	**Run 1**
Operator	TMZ
Filter No.	20112548
Barometric Pressure (P_b)	29.70 in Hg
Stack Static Pressure (P_s)	-1.2 in H_2O
Stack Dimensions (Diameter)	39.25
Pitot Tube	30
Meter No.	2
Meter Isokinetic Factor (Kiso)	0.972
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	3 %	
Condensate (V_{lc})	0.7 g	
Silica Gel Weight Gain (V_{lc})	8.2 g	
Nozzle Diameter	0.180 in	
Leak Rate Initial	0.000 ft^3/min at	7 in Hg
Leak Rate Final	0.000 ft^3/min at	5 in Hg
Traverse Points	12	
Pitot Correction Factor (C_p)	0.84	
Meter Correction Factor (Y)	0.994	
Gas Composition (%)		
CO_2	0	
O_2	21	

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	488.0	487.4	0.6
2	641.8	641.8	0.0
3	664.2	664.1	0.1
4	1002.4	994.2	8.2

Traverse Point	Sampling Time (minute)	Sampling Time: Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	7:59	3	67	1.2	1.2	25.019	16	16	250	255	14	68	527	1.095
5	5.0		3	67	1.4	1.4	28.86	16	16	249	255	16	69	527	1.183
4	10.0		3	67	1.6	1.6	31.44	16	16	249	255	17	70	527	1.265
3	15.0		3	67	1.6	1.6	34.52	16	16	247	252	18	70	527	1.265
2	20.0		3	67	1.5	1.5	38.20	17	16	247	256	20	70	527	1.225
1	25.0		3	67	1.3	1.3	41.68	18	16	245	255	22	70	527	1.140
Port	30.0	8:29	-	-	-	-	44.890	-	-	-	-	-	-		
6	30.0	8:39	3	67	0.96	0.96	44.890	19	16	248	255	22	70	527	0.980
5	35.0		3	68	1.3	1.3	47.66	20	16	246	255	23	71	528	1.140
4	40.0		3	67	1.3	1.3	50.99	21	17	246	255	23	71	527	1.140
3	45.0		3	67	1.7	1.7	54.34	21	17	249	255	21	70	527	1.304
2	50.0		3	67	1.4	1.4	57.88	21	18	246	255	21	70	527	1.183
1	55.0		3	67	1.3	1.3	60.84	21	18	248	255	21	68	527	1.140
End	60.0	9:09	-	-	-	-	64.751	-	-	-	-	-	-	527	1.172
Average	60.0		3	67	1.4	1.4	39.732	19	17	248	255	20	70	17.50	

Facility Arauco North America
Source Designation BH13
Test Date Thursday, March 4, 2021
Test Run Run 2
Operator TMZ
Filter No. 20112563
Barometric Pressure (P_b) 29.70 in Hg
Stack Static Pressure (P_s) -1.2 in H_2O
Stack Dimensions (Diameter) 39.25
Pitot Tube 30
Meter No. 2
Meter Isokinetic Factor (Kiso) 0.974
ΔH at 0.75 cfm 1.83

Assumed Moisture (B_{ws}) 3 %
Condensate (V_{lc}) 0.2 g
Silica Gel Weight Gain (V_{lc}) 5.6 g
Nozzle Diameter 0.180 in
Leak Rate Initial 0.000 ft^3/min at 8 in Hg
Leak Rate Final 0.000 ft^3/min at 5 in Hg
Traverse Points 12
Pitot Correction Factor (C_p) 0.84
Meter Correction Factor (Y) 0.994
Gas Composition (%)
CO_2 0
O_2 21

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	498.0	498.0	0.0
2	659.1	659.0	0.1
3	662.3	662.2	0.1
4	978.7	973.1	5.6

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	9:31	3	67	1.1	1.1	64.806	18	18	246	255	18	78	527	1.049
5	5.0		3	67	1.5	1.5	67.91	19	18	248	255	18	74	527	1.225
4	10.0		3	67	1.2	1.2	70.99	20	18	245	257	18	73	527	1.095
3	15.0		3	67	1.4	1.4	74.51	21	18	245	255	19	70	527	1.183
2	20.0		3	67	1.5	1.5	77.90	21	19	248	254	20	70	527	1.225
1	25.0		3	67	1.5	1.5	81.42	22	19	249	255	21	68	527	1.225
Port	30.0	10:01	-	-	-	-	84.925	-	-	-	-	-	-		
6	30.0	10:06	3	67	1.0	1.0	84.925	22	19	250	255	22	69	527	1.000
5	35.0		3	67	1.4	1.4	87.87	22	18	250	255	23	69	527	1.183
4	40.0		3	67	1.4	1.4	91.21	23	18	250	255	22	70	527	1.183
3	45.0		3	67	1.4	1.4	94.56	23	19	250	255	24	71	527	1.183
2	50.0		3	67	1.6	1.6	97.02	23	19	250	255	25	69	527	1.265
1	55.0		3	67	1.4	1.4	101.84	24	20	250	255	25	67	527	1.183
End	60.0	10:36	-	-	-	-	104.695	-	-	-	-	-	-	527	1.1666
Average	60.0		3	67	1.4	1.4	39.889	22	19	248	255	21	71	20.04	

Facility	Arauco North America
Source Designation	BH13
Test Date	Thursday, March 4, 2021
Test Run	**Run 3**
Operator	TMZ
Filter No.	20112549
Barometric Pressure (P_b)	29.70 in Hg
Stack Static Pressure (P_s)	-1.2 in H_2O
Stack Dimensions (Diameter)	39.25
Pitot Tube	30
Meter No.	2
Meter Isokinetic Factor (Kiso)	0.980
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	3 %	
Condensate (V_{lc})	0.6 g	
Silica Gel Weight Gain (V_{lc})	6.1 g	
Nozzle Diameter	0.180 in	
Leak Rate Initial	0.000 ft^3/min at	8 in Hg
Leak Rate Final	0.000 ft^3/min at	5 in Hg
Traverse Points	12	
Pitot Correction Factor (C_p)	0.84	
Meter Correction Factor (Y)	0.994	
Gas Composition (%)		
CO_2	0	
O_2	21	

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	487.1	487.1	0.0
2	642.3	642.3	0.0
3	673.1	672.5	0.6
4	1008.5	1002.4	6.1

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	10:50	3	67	1.0	1.0	104.743	21	20	250	255	20	78	527	1.000
5	5.0		3	67	1.1	1.1	107.63	21	20	245	255	20	74	527	1.049
4	10.0		3	67	1.6	1.6	110.75	21	20	245	255	20	73	527	1.265
3	15.0		3	67	1.3	1.3	113.89	22	20	250	255	20	72	527	1.140
2	20.0		3	67	1.2	1.2	117.50	23	21	250	255	20	72	527	1.095
1	25.0		3	67	1.2	1.2	120.19	23	21	250	255	20	70	527	1.095
Port	30.0	11:20	-	-	-	-	123.761	-	-	-	-	-			
6	30.0	11:25	3	67	0.89	0.89	123.761	23	21	250	254	20	69	527	0.943
5	35.0		3	67	1.3	1.3	126.58	24	21	250	255	20	69	527	1.140
4	40.0		4	67	1.4	1.4	129.69	24	21	250	255	20	68	527	1.183
3	45.0		4	67	1.7	1.7	133.74	25	21	250	255	20	68	527	1.304
2	50.0		4	67	1.5	1.5	136.77	25	22	250	254	21	67	527	1.225
1	55.0		4	67	1.2	1.2	140.31	26	22	250	254	21	67	527	1.095
End	60.0	11:55	-	-	-	-	143.392	-	-	-	-	-	-	527	1.128
Average	60.0		3	67	1.3	1.3	38.649	23	21	249	255	20	71	22.00	

Facility	Arauco North America
Source Designation	Press
Test Date	Friday, March 5, 2021
Test Run	**Run 1**
Operator	BY
Filter No.	20112564
Barometric Pressure (P_b)	30.31 in Hg
Stack Static Pressure (P_s)	1.2 in H_2O
Stack Dimensions (Diameter)	60
Pitot Tube	46
Meter No.	2
Meter Isokinetic Factor (Kiso)	0.952
ΔH at 0.75 cfm	1.83

Assumed Moisture (B_{ws})	3 %	
Condensate (V_{lc})	19.4 g	
Silica Gel Weight Gain (V_{lc})	7.3 g	
Nozzle Diameter	0.180 in	
Leak Rate Initial	0.000 ft^3/min at	14 in Hg
Leak Rate Final	0.000 ft^3/min at	6 in Hg
Traverse Points	12	
Pitot Correction Factor (C_p)	0.84	
Meter Correction Factor (Y)	0.994	
Gas Composition (%)		
CO_2	0	
O_2	21	

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	507.2	500.3	6.9
2	666.3	658.7	7.6
3	667.2	662.3	4.9
4	986.0	978.7	7.3

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	8:37	4	86	1.3	1.2	143.470	20	14	250	252	19	65	546	1.140
5	5.0		4	85	1.3	1.2	146.86	21	20	251	256	24	66	545	1.140
4	10.0		4	86	1.4	1.3	150.00	23	21	255	256	24	66	546	1.183
3	15.0		4	86	1.3	1.2	153.60	25	22	254	255	26	66	546	1.140
2	20.0		4	85	1.2	1.1	156.81	27	23	254	254	26	67	545	1.095
1	25.0		4	86	1.1	1.0	159.20	30	24	252	253	26	69	546	1.049
Port	30.0	9:07	-	-	-	-	162.600	-	-	-	-	-	-		
6	30.0	9:17	4	90	1.1	1.0	162.600	30	24	225	255	31	69	550	1.049
5	35.0		4	91	1.2	1.1	165.70	30	24	228	255	32	70	551	1.095
4	40.0		4	92	1.2	1.1	168.80	32	26	238	255	33	70	552	1.095
3	45.0		4	92	1.3	1.2	172.15	32	26	255	255	33	67	552	1.140
2	50.0		4	90	1.3	1.2	175.48	34	26	255	255	34	68	550	1.140
1	55.0		4	90	1.1	1.0	178.52	34	26	256	255	34	68	550	1.049
End	60.0	9:47	-	-	-	-	181.575	-	-	-	-	-	-	548	1.110
Average	60.0		4	88	1.2	1.1	38.105	28	23	248	255	29	68	25.58	

Facility	Arauco North America		
Source Designation	Press		
Test Date	Friday, March 5, 2021	**Assumed Moisture (B_{ws})**	3 %
Test Run	**Run 2**	**Condensate (V_{lc})**	17.5 g
Operator	BY	**Silica Gel Weight Gain (V_{lc})**	7.6 g
Filter No.	20112550	**Nozzle Diameter**	0.180 in
Barometric Pressure (P_b)	30.31 in Hg	**Leak Rate Initial**	0.000 ft^3/min at 15 in Hg
Stack Static Pressure (P_s)	1.2 in H_2O	**Leak Rate Final**	0.000 ft^3/min at 7 in Hg
Stack Dimensions **(Diameter)**	60	**Traverse Points**	12
Pitot Tube	46	**Pitot Correction Factor (C_p)**	0.84
Meter No.	2	**Meter Correction Factor (Y)**	0.994
Meter Isokinetic Factor (Kiso)	0.975	**Gas Composition (%)**	
ΔH at 0.75 cfm	1.83	**CO_2**	0
		O_2	21

APEX

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	502.5	488.1	14.4
2	645.6	642.5	3.1
3	673.1	673.1	0.0
4	1018.7	1011.1	7.6

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	9:57	4	89	1.4	1.3	181.720	32	30	255	256	29	65	549	1.183
5	5.0		4	90	1.3	1.2	185.15	32	30	254	255	30	65	550	1.140
4	10.0		4	91	1.3	1.2	188.55	32	30	257	256	31	66	551	1.140
3	15.0	Pause Press Down	4	91	1.2	1.1	191.80	33	30	257	255	32	66	551	1.095
2	20.0	10:17/12:00	4	91	1.2	1.1	195.10	34	30	257	255	34	66	551	1.095
1	25.0		4	88	1.2	1.0	197.31	34	30	258	255	34	66	548	1.095
Port	30.0	12:10	-	-	-	-	201.600	-	-	-	-	-	-		
6	30.0	12:15	4	90	1.2	1.2	201.600	36	34	251	251	30	66	550	1.095
5	35.0		4	90	1.3	1.2	205.05	38	37	251	255	30	67	550	1.140
4	40.0		5	90	1.3	1.2	208.45	38	37	252	255	30	67	550	1.140
3	45.0		5	90	1.2	1.1	211.20	38	37	252	255	30	67	550	1.095
2	50.0		6	90	1.2	1.1	213.31	38	37	255	255	30	67	550	1.095
1	55.0		6	90	1.1	1.0	215.25	38	37	256	255	30	67	550	1.049
End	60.0	12:45	-	-	-	-	218.000	-	-	-	-	-	-	550	1.1138
Average	60.0		5	90	1.2	1.1	36.280	35	33	255	255	31	66	34.25	

Facility	Arauco North America			
Source Designation	Press			
Test Date	Friday, March 5, 2021	**Assumed Moisture (B_{ws})**	3 %	
Test Run	**Run 3**	**Condensate (V_{lc})**	22.2 g	
Operator	BY	**Silica Gel Weight Gain (V_{lc})**	9.3 g	
Filter No.	20112565	**Nozzle Diameter**	0.180 in	
Barometric Pressure (P_b)	30.31 in Hg	**Leak Rate Initial**	0.000 ft^3/min at	16 in Hg
Stack Static Pressure (P_s)	1.2 in H_2O	**Leak Rate Final**	0.000 ft^3/min at	6 in Hg
Stack Dimensions **(Diameter)**	60	**Traverse Points**	12	
Pitot Tube	46	**Pitot Correction Factor (C_p)**	0.84	
Meter No.	2	**Meter Correction Factor (Y)**	0.994	
Meter Isokinetic Factor (Kiso)	0.995	**Gas Composition (%)**		
ΔH at 0.75 cfm	1.83	**CO_2**	0	
		O_2	21	

Moisture	Weight (g)		
Impinger No.	Final	Initial	Gain
1	515.8	498.4	17.4
2	663.8	659.7	4.1
3	667.9	667.2	0.7
4	983.0	973.7	9.3

Traverse Point	Sampling Time (minute)	Clock Time (24 hour)	Sampling Vacuum (in Hg)	Stack Temperature T_s (°F)	Velocity Pressure ΔP_s (in H_2O)	Orifice Differential, ΔH (in H_2O)	Sample Volume V_m (ft^3)	Dry-Gas Meter Temperature Inlet, T_m (°F)	Dry-Gas Meter Temperature Outlet, T_m (°F)	Probe Temperature (°F)	Filter Box Temperature (°F)	Last Impinger Temperature (°F)	Auxiliary Temperature (°F)	T + 460 (°R)	$(\Delta Ps)^{0.5}$ (in $H_2O)^{0.5}$
6	0.0	13:15	4	87	1.3	1.2	218.100	38	38	251	254	36	66	547	1.140
5	5.0		4	90	1.3	1.2	221.56	38	38	251	254	37	66	550	1.140
4	10.0		4	91	1.2	1.1	224.85	38	38	255	255	38	66	551	1.095
3	15.0		4	90	1.2	1.1	228.26	38	38	254	255	39	67	550	1.095
2	20.0		4	88	1.1	1.0	231.20	37	37	254	255	40	67	548	1.049
1	25.0		4	89	1.1	1.0	234.18	37	37	254	255	40	69	549	1.049
Port	30.0	13:45	-	-	-	-	236.980	-	-	-	-	-	-		
6	30.0	13:55	4	92	1.3	1.2	236.980	38	37	255	255	33	68	552	1.140
5	35.0		4	91	1.2	1.1	240.27	39	37	254	254	33	66	551	1.095
4	40.0		4	91	1.2	1.1	243.44	40	37	255	246	34	68	551	1.095
3	45.0		4	90	1.1	1.0	246.68	40	38	256	246	34	69	550	1.049
2	50.0		4	92	1.1	1.0	249.85	40	38	251	248	34	69	552	1.049
1	55.0		4	92	1.1	1.0	252.90	40	38	251	248	35	69	552	1.049
End	60.0	14:25	-	-	-	-	255.860	-	-	-	-	-	-	550	1.087
Average	60.0		4	90	1.2	1.1	37.760	39	38	253	252	36	68	38.08	

Appendix E
Laboratory Data

BUREAU VERITAS

Your Project #: 11020-000020.00
Site Location: ARAUCO
Your C.O.C. #: 22759

Attention: David Kawasaki

Apex Companies, LLC
22345 Roethel Drive
Novi, MI
USA 48375

Report Date: 2021/03/23
Report #: R6566178
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C166759
Received: 2021/03/12, 14:19

Sample Matrix: Stack Sampling Train
Samples Received: 29

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Extractable Condensables (M202)	15	2021/03/18	2021/03/22	BRL SOP-00118	EPA 202 m
Non Extractable Condensibles (M202)	15	2021/03/18	2021/03/19	BRL SOP-00118 / BRL SOP-00109	EPA 202 m
Particulates/Acetone Rinse (M5/315/M201)	13	2021/03/17	2021/03/17	BRL SOP-00109	EPA 5/315 m
Particulates/Filter (M5/315/NJATM1/M201)	13	N/A	2021/03/16	BRL SOP-00109	EPA 5/315/NJATM1 m
Final Volume of Acetone Probe Rinse	13	N/A	2021/03/15	BRL SOP-00109	
Weight of Solvent from Impingers	14	N/A	2021/03/18		
Weight of Water from Impingers	14	N/A	2021/03/18		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your Project #: 11020-000020.00
Site Location: ARAUCO
Your C.O.C. #: 22759

Attention: David Kawasaki

Apex Companies, LLC
22345 Roethel Drive
Novi, MI
USA 48375

Report Date: 2021/03/23
Report #: R6566178
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C166759
Received: 2021/03/12, 14:19

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, CET LEAD-Air Toxics, Source Evaluation
Email: Clayton.Johnson@bureauveritas.com
Phone# (905)817-5769
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BUREAU VERITAS

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

BV Labs ID		PBH291	PBH292	PBH293	PBH397	PBH403		
Sampling Date		2021/03/05	2021/03/02	2021/03/02	2021/03/02	2021/03/03		
COC Number		22759	22759	22759	22759	22759		
	UNITS	**M5-BLANK**	**M5- RTO-R1**	**M5- RTO-R2**	**M5- RTO-R3**	**M5- BH11-R1**	**RDL**	**QC Batch**
Acetone Rinse Particulate Weight in Acetone Rinse	mg	0.7	12.4	8.4	6.1	3.5	0.5	7251391
Front Half Particulate Weight on Filter	mg	<0.30	5.60	7.00	4.00	<0.30 (1)	0.30	7249241
Acetone Rinse Volume	ml	130	60	47	59	39	1	7248947

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Negative weight observed

BV Labs ID		PBH404	PBH405	PBH406	PBH407		
Sampling Date		2021/03/03	2021/03/03	2021/03/04	2021/03/04		
COC Number		22759	22759	22759	22759		
	UNITS	**M5- BH11-R2**	**M5- BH11-R3**	**M5- BH13-R1**	**M5- BH13-R2**	**RDL**	**QC Batch**
Acetone Rinse Particulate Weight in Acetone Rinse	mg	3.5	3.3	6.6	2.3	0.5	7251391
Front Half Particulate Weight on Filter	mg	<0.30 (1)	<0.30 (2)	<0.30 (2)	<0.30 (2)	0.30	7249241
Acetone Rinse Volume	ml	52	46	46	39	1	7248947

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) M5 filter and M202 filter received in switched dishes. Filters were replaced in proper dishes
Negative weight observed
(2) Negative weight observed

BV Labs ID		PBH408	PBH409	PBH410	PBH411		
Sampling Date		2021/03/04	2021/03/05	2021/03/05	2021/03/05		
COC Number		22759	22759	22759	22759		
	UNITS	**M5- BH13-R3**	**M5- PRESS-R1**	**M5- PRESS-R2**	**M5- PRESS-R3**	**RDL**	**QC Batch**
Acetone Rinse Particulate Weight in Acetone Rinse	mg	2.2	1.9	3.9	9.2	0.5	7251391
Front Half Particulate Weight on Filter	mg	<0.30 (1)	2.80	1.50	2.00	0.30	7249241
Acetone Rinse Volume	ml	83	63	54	100	1	7248947

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Negative weight observed

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BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

BV Labs ID		PBH413			PBH416		
Sampling Date		2021/03/05			2021/03/05		
COC Number					22759		
	UNITS	**M202- PROOF BLANK**	**RDL**	**QC Batch**	**M202- FILT BLANK**	**RDL**	**QC Batch**
Weight	g	130	0.1	7254722			
Weight of Solvent	g	120	0.1	7254718			
Miscellaneous Parameters							
Inorganic Condensibles	mg	1.2	0.5	7254724	0.8	0.5	7254724
Organic Condensibles	mg	2.7	1.0	7254699	<1.0	1.0	7254699

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		PBH417			PBH418		
Sampling Date		2021/03/05			2021/03/05		
COC Number							
	UNITS	**M202- HEX BLANK**	**RDL**	**QC Batch**	**M202- DI BLANK**	**RDL**	**QC Batch**
Weight	g				140	0.1	7254722
Weight of Solvent	g	91	0.1	7254718			
Miscellaneous Parameters							
Inorganic Condensibles	mg				0.7	0.5	7254724
Organic Condensibles	mg	3.7	1.0	7254699			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		PBH421	PBH422	PBH423	PBH424		
Sampling Date		2021/03/02	2021/03/02	2021/03/02	2021/03/03		
COC Number							
	UNITS	**M202- RTO-R1**	**M202- RTO-R2**	**M202- RTO-R3**	**M202- BH11-R1**	**RDL**	**QC Batch**
Weight	g	320	400	380	240	0.1	7254722
Weight of Solvent	g	99	59	78	74	0.1	7254718
Miscellaneous Parameters							
Inorganic Condensibles	mg	6.4	10	7.0	3.3	0.5	7254724
Organic Condensibles	mg	9.2	12	11	3.7	1.0	7254699

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BUREAU VERITAS

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

BV Labs ID		PBH425	PBH426	PBH427	PBH428		
Sampling Date		2021/03/03	2021/03/03	2021/03/04	2021/03/04		
COC Number							
	UNITS	**M202- BH11-R2**	**M202- BH11-R3**	**M202- BH13-R1**	**M202- BH13-R2**	**RDL**	**QC Batch**
Weight	g	260	170	200	170	0.1	7254722
Weight of Solvent	g	85	87	82	71	0.1	7254718
Miscellaneous Parameters							
Inorganic Condensibles	mg	1.9	1.6	1.5	1.2	0.5	7254724
Organic Condensibles	mg	1.6	3.6	2.2	2.0	1.0	7254699

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		PBH429	PBH430	PBH431	PBH432		
Sampling Date		2021/03/04	2021/03/05	2021/03/05	2021/03/05		
COC Number							
	UNITS	**M202- BH13-R3**	**M202- PRESS-R1**	**M202- PRESS-R2**	**M202- PRESS-R3**	**RDL**	**QC Batch**
Weight	g	180	230	160	150	0.1	7254722
Weight of Solvent	g	89	66	91	110	0.1	7254718
Miscellaneous Parameters							
Inorganic Condensibles	mg	1.8	5.1	5.1	5.5	0.5	7254724
Organic Condensibles	mg	<1.0	5.2	5.2	7.8	1.0	7254699

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BUREAU VERITAS

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PBH291 **Collected:** 2021/03/05
Sample ID: M5- BLANK **Shipped:**
Matrix: Stack Sampling Train **Received:** 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH292 **Collected:** 2021/03/02
Sample ID: M5- RTO- R1 **Shipped:**
Matrix: Stack Sampling Train **Received:** 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH293 **Collected:** 2021/03/02
Sample ID: M5- RTO- R2 **Shipped:**
Matrix: Stack Sampling Train **Received:** 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH397 **Collected:** 2021/03/02
Sample ID: M5- RTO- R3 **Shipped:**
Matrix: Stack Sampling Train **Received:** 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH403 **Collected:** 2021/03/03
Sample ID: M5- BH11- R1 **Shipped:**
Matrix: Stack Sampling Train **Received:** 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

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BUREAU VERITAS

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PBH404
Sample ID: M5- BH11- R2
Matrix: Stack Sampling Train

Collected: 2021/03/03
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH405
Sample ID: M5- BH11- R3
Matrix: Stack Sampling Train

Collected: 2021/03/03
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH406
Sample ID: M5- BH13- R1
Matrix: Stack Sampling Train

Collected: 2021/03/04
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH407
Sample ID: M5- BH13- R2
Matrix: Stack Sampling Train

Collected: 2021/03/04
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH408
Sample ID: M5- BH13- R3
Matrix: Stack Sampling Train

Collected: 2021/03/04
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PBH409
Sample ID: M5- PRESS- R1
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH410
Sample ID: M5- PRESS- R2
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH411
Sample ID: M5- PRESS- R3
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	7251391	2021/03/17	2021/03/17	Theodora LI
Particulates/Filter (M5/315/NJATM1/M201)	BAL	7249241	N/A	2021/03/16	Theodora LI
Final Volume of Acetone Probe Rinse		7248947	N/A	2021/03/15	Theodora LI

BV Labs ID: PBH413
Sample ID: M202- PROOF BLANK
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH416
Sample ID: M202- FILT BLANK
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman

BUREAU VERITAS

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PBH417
Sample ID: M202- HEX BLANK
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH418
Sample ID: M202- DI BLANK
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH421
Sample ID: M202- RTO- R1
Matrix: Stack Sampling Train

Collected: 2021/03/02
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH422
Sample ID: M202- RTO- R2
Matrix: Stack Sampling Train

Collected: 2021/03/02
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH423
Sample ID: M202- RTO- R3
Matrix: Stack Sampling Train

Collected: 2021/03/02
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PBH424
Sample ID: M202- BH11- R1
Matrix: Stack Sampling Train

Collected: 2021/03/03
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH425
Sample ID: M202- BH11- R2
Matrix: Stack Sampling Train

Collected: 2021/03/03
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH426
Sample ID: M202- BH11- R3
Matrix: Stack Sampling Train

Collected: 2021/03/03
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH427
Sample ID: M202- BH13- R1
Matrix: Stack Sampling Train

Collected: 2021/03/04
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH428
Sample ID: M202- BH13- R2
Matrix: Stack Sampling Train

Collected: 2021/03/04
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PBH429
Sample ID: M202- BH13- R3
Matrix: Stack Sampling Train

Collected: 2021/03/04
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH430
Sample ID: M202- PRESS- R1
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH431
Sample ID: M202- PRESS- R2
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

BV Labs ID: PBH432
Sample ID: M202- PRESS- R3
Matrix: Stack Sampling Train

Collected: 2021/03/05
Shipped:
Received: 2021/03/12

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	7254699	2021/03/18	2021/03/22	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	7254724	2021/03/18	2021/03/19	Muhammad M Rahman
Weight of Solvent from Impingers		7254718	N/A	2021/03/18	Muhammad M Rahman
Weight of Water from Impingers		7254722	N/A	2021/03/18	Muhammad M Rahman

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

GENERAL COMMENTS

Sample PBH413 [M202- PROOF BLANK] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH416 [M202- FILT BLANK] : ORGANIC EXTRACTION : No residue noted in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH417 [M202- HEX BLANK] : ORGANIC EXTRACTION : Oily material found in vial.

Sample PBH418 [M202- DI BLANK] : INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH421 [M202- RTO- R1] : ORGANIC EXTRACTION : Yellowish oily material found in vial.
INORGANIC EXTRACTION : Brownish residue found in teflon dish.

Sample PBH422 [M202- RTO- R2] : ORGANIC EXTRACTION : Yellowish oily material found in vial.
INORGANIC EXTRACTION : Brownish residue found in teflon dish.

Sample PBH423 [M202- RTO- R3] : ORGANIC EXTRACTION : Yellowish oily material found in vial.
INORGANIC EXTRACTION : Brownish residue found in teflon dish.

Sample PBH424 [M202- BH11- R1] : ORGANIC EXTRACTION : Whitish material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH425 [M202- BH11- R2] : ORGANIC EXTRACTION : Whitish material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH426 [M202- BH11- R3] : ORGANIC EXTRACTION : Whitish material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH427 [M202- BH13- R1] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH428 [M202- BH13- R2] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH429 [M202- BH13- R3] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Whitish residue found in teflon dish.

Sample PBH430 [M202- PRESS- R1] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Yellowish oily residue found in teflon dish.

Sample PBH431 [M202- PRESS- R2] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Brownish residue found in teflon dish.

Sample PBH432 [M202- PRESS- R3] : ORGANIC EXTRACTION : Oily material found in vial.
INORGANIC EXTRACTION : Yellowish oily residue found in teflon dish.

Results relate only to the items tested.

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BV Labs Job #: C166759
Report Date: 2021/03/23

Apex Companies, LLC
Client Project #: 11020-000020.00
Site Location: ARAUCO
Sampler Initials: DK

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
7251391	TL2	Method Blank	Acetone Rinse Particulate Weight in Acetone Ri	2021/03/17	<0.5		mg	
7254699	MOR	Spiked Blank	Organic Condensibles	2021/03/22		100	%	70 - 130
7254699	MOR	Method Blank	Organic Condensibles	2021/03/22	<1.0		mg	
7254724	MOR	Method Blank	Inorganic Condensibles	2021/03/23	<0.5		mg	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brenda Moore

Brenda Moore, Team Lead, Inorganic

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

C166759

Chain of Custody Form - Source

Maxxam Analytics
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Page 1 of 1

ANALYSIS REQUESTED

CLIENT INFORMATION SECTION

Company Name: Apex Companies LLC
Project Manager: David Kawasaki
e-mail: david.kawasaki@apexcos.com
Address:
Phone: 248-590-5134
Fax: -
Sampled by: David Kawasaki

MAXXAM use only	Field Sample ID	# Bottles	Collection Date	Collection Time	Initial Impinger Charge Volumes (mL)*	EPA 5/202
	RTO M5/202 Run 1	3+2 filter	3/2/21			x
	RTO M5/202 Run 2	3+2 filter	3/2/21			x
	RTO M5/202 Run 3	3+2 filter	3/2/21			x
	BH11 M5/202 Run 1	3+2 filter	3/3/21			x
	BH11 M5/202 Run 2	3+2 filter	3/3/21			x
	BH11 M5/202 Run 3	3+2 filter	3/3/21			x
	BH13 M5/202 Run 1	3+2 filter	3/4/21			x
	BH13 M5/202 Run 2	3+2 filter	3/4/21			x
	BH13 M5/202 Run 3	3+2 filter	3/4/21			x
	Press M5/202 Run 1	3+2 filter	3/5/21			x
	Press M5/202 Run 2	3+2 filter	3/5/21			x
	Press M5/202 Run 3	3+2 filter	3/5/21			x
	Reagent Blank	3+2 filter	3/5/21			x
	Proof Blank	2	3/5/21			x

TAT Requirement
STD 10 Business day ✓
Rush 5 Business day
Rush 2 Business day
Rush 1 Business day
Other (specify):

PROJECT INFORMATION
Project #: 11020-000020.00
Name: Arauco
PO #:
Maxxam Quote #:
Maxxam Contact:

REPORTING REQUIREMENTS
Summary Report only
Summary Report & Raw Data Package **
** additional cost may apply

PROJECT SPECIFIC COMMENTS
* Initial Impinger charge volumes are required before the following analysis can be started: Method 26, CTM-027 & Method 8

Client Signature: [signature]
Affiliation: Apex
Date/Time: 3/5/21

Received by: Reinard Widjaja
Affiliation:
Date/Time: 2021/03/12 14:19

Method 23 / TO9A
2005 WHO ☐ TEF x DL ☐
1989 NATO TEF ☐ TEF x 0 DL ☐
1998 WHO ☐ TEF x 0.5 DL ☐

Appendix F
Facility Operating Data

David Kawasaki

From: James Osga <james.osga@arauco.com>
Sent: Thursday, March 25, 2021 10:33 AM
To: tvantil@comcast.net; David Kawasaki
Subject: [EXT] RE: Arauco Production Data

CAUTION

RTO temperature, flake production in oven dried ton, natural gas usage
RTO Run times (March 2):
8:40-9:40 -See TV comment below
10:00-11:00 -See TV comment below
11:14-12:14 -See TV comment be

Baghouse pressure drop
BH11 Run times (March 3):
7:22-8:22 5.0-5.1 mbar
8:42-9:43 4.86-4.91 mbar
10:00-11:00 4.90-5.05 mbar
BH13 Run times (March 4):
7:59-8:59 1.70-1.78 mbar
9:31-10:31 1.69-1.79 mbar
10:50-11:50 1.67-1.79 mbar

Water flowrate through the wet scrubber, board production in units of 1,000 square feet on a ¾" basis, gross
Press run times (March 5):
8:47-9:47 793-796 gpm
11:52-12:52 812-819 gpm
13:15-14:15 813 gpm

From: tvantil@comcast.net <tvantil@comcast.net>
Sent: Thursday, March 25, 2021 9:46 AM
To: 'David Kawasaki' <David.Kawasaki@apexcos.com>; James Osga <james.osga@arauco.com>
Subject: RE: Arauco Production Data

Advertencia: Este es un correo externo. No abra/descargue archivos desconocidos; no haga clic en enlaces sin antes verificar la procedencia de los correos.

David –

The 3-hour average RTO temperature from 9 am to 12 pm was 1576 F for all 3 RTO's on March 2

James – can you confirm the below values, I am getting these off daily report reading a colored graph, lol:

BH#11 on March 3 varied from 2.6 to 2.7" pressure drop during the test period

BH#13 on March 4 varied from 2.4 to 2.6" pressure drop during the test period

James – can you go back in the historian and get the details on the quench pump flow for March 5 for the times described? Recall that we had plugging so the data in the daily report is not helpful as it shows such wide variability for the day.

Thanks –

Tammi

From: David Kawasaki <David.Kawasaki@apexcos.com>
Sent: Wednesday, March 24, 2021 1:13 PM
To: 'James Osga' <james.osga@arauco.com>; Tammi Van Til <tvantil@comcast.net>
Subject: Arauco Production Data

Hi Jim and Tammi,

When you have some free time, could you please gather the production data from testing? EGLE requires the following:

RTO temperature, flake production in oven dried ton, natural gas usage
RTO Run times (March 2):
8:40-9:40
10:00-11:00
11:14-12:14

Baghouse pressure drop
BH11 Run times (March 3):
7:22-8:22
8:42-9:43
10:00-11:00
BH13 Run times (March 4):
7:59-8:59
9:31-10:31
10:50-11:50

Water flowrate through the wet scrubber, board production in units of 1,000 square feet on a ¾" basis, gross
Press run times (March 5):
8:47-9:47
11:52-12:52
13:15-14:15

Please let me know if you have any questions.

Thanks,

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Add me to your contact list!

ENR Top 30 All-Environmental Firm

We've moved! Our new address is 46555 Humboldt Dr. Ste 103, Novi, MI 48377. Please update your contact list. Thanks.