SOURCE TEST REPORT
2022 COMPLIANCE TESTING
ECOLUBE RECOVERY
REGENERATIVE THERMAL OXIDIZER #1
PORTLAND, OREGON

Prepared For:

Ecolube Recovery
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For Submittal To:

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STAC
STACK TESTING ACCREDITATION COUNCIL

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TO ASTM D7036 ONLY
CERT #3925.01

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REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature: Joe Heffernan   Date: 04 / 08 / 2022

Name: Joe Heffernan   Title: Client Project Manager

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: Amber Little   Date: 04 / 08 / 2022

Name: Amber Little   Title: Reporting Hub Manager

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1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Ecolube Recovery (Ecolube) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance emissions test program on the Regenerative Thermal Oxidizer (RTO) at the facility located in Portland, Oregon. The tests were conducted to determine compliance with VOC destruction efficiency and emission factor verification requirements of the Oregon Department of Environmental Quality (ODEQ) Permit No. 26-3021-ST-1, plus outlet RTO testing in order to provide a complete and approvable inventory for the purposes of the Cleaner Air Oregon program.

The specific objectives were to:

- Measure emissions of VOCs, O_2 and CO_2 at the inlet / outlet of the RTO #1
- Measure emissions of each dioxin and furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners
- Measure emissions of each PCB congener listed in OAR 340-245-8020 Table 2
- Measure emissions of each PAH and PAN-derivative listed in OAR 340-245-8020 Table 2
- Measure emissions of chlorobenzene and chlorophenol
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

TABLE 1-1
SUMMARY OF TEST PROGRAM

Test Dates	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
1/26-27/2022	RTO In/Out	Velocity/Volumetric Flow Rate	EPA 1 & 2	4 Inlet/ 3 Outlet	60 Inlet/ 240 Outlet
“”	RTO In/Out	O_2, CO_2	EPA 3/3A	4	60
“”	RTO In/Out	Moisture	EPA 4	4 Inlet/ 3 Outlet	60 Inlet/ 240 Outlet
“”	RTO Out	Visible Emissions	EPA 9	3	6
“”	RTO Out	PCDD, PCDF	EPA 23	3	240
“”	RTO In/Out	VOC	EPA 25A	4	60
“”	RTO In/Out	Post-test thermocouple calibration check	EPA ALT-011	--	--

To simplify this report, a list of Units and Abbreviations is included in Appendix D.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective permit limits in Table 1-2. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

The testing was conducted by the Montrose personnel listed in Table 1-3. The tests were conducted according to the test plan (protocol) dated November 8, 2021 that was submitted to and approved by the ODEQ.

TABLE 1-2
SUMMARY OF AVERAGE COMPLIANCE RESULTS -
RTO #1
JANUARY 26-27, 2022

Parameter/Units	Average Results	Emission Limits
Total Hydrocarbons, as Propane (VOC) (RTO Inlet)		
ppmvd	331	--
lb/hr	5.9	--
Total Hydrocarbons, as Propane (VOC) (RTO Outlet)		
ppmvd	21	--
lb/hr	0.40	--
% destruction	93	≥97%
Total Dioxins/Furans		
ng/m^3	$<1.11 \times 10^{-1}$	--
lb/hr	$<1.18 \times 10^{-9}$	--
Total PAHs		
ng/m^3	$<5.32 \times 10^{4}$	--
lb/hr	$<5.57 \times 10^{-4}$	--
Total PCBs		
ng/m^3	1.14×10^{1}	--
lb/hr	1.23×10^{-7}	--
Visible Emissions		
% opacity	0	20

Note: individual congeners and chlorobenzenes/chlorophenol results available in section 4 tables and in Appendix A.5.

1.2 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location:	Ecolube Recovery 11535 N Force Avenue Portland, OR 97217
Project Contact:	Eric Spencer
Role:	Chief Executive Officer
Company:	Ecolube Recovery
Telephone:	503-209-5249
Email:	espencer@ecoluberecovery.com

Agency Information

Regulatory Agency:	Oregon Department of Environmental Quality	
Agency Contact:	Thomas Rhodes	Joshua Muswieck
Telephone:	503-229-5534	971-349-0956
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Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC
Contact:	Joe Heffernan
Title:	Client Project Manager
Telephone:	503-702-8683
Email:	jheffernan@montrose-env.com

Laboratory Information

Laboratory:	Enthalpy Analytical
City, State:	Wilmington, NC
Method:	EPA 23

Subcontractor (or Consultant) Information

Company:	Bridgewater Group
Contact:	John Browning
Telephone:	503-412-9842
Email:	jbrowning@bridgeh2o.com

Test personnel and observers are summarized in Table 1-3.

TABLE 1-3
TEST PERSONNEL AND OBSERVERS

Name	Affiliation	Role/Responsibility
Joe Heffernan	Montrose	Project Manager/Field Team Leader/Qualified Individual (QI)/Trailer operator/Sample recovery
Preston Bauder	Montrose	Sample train operator
Julian Vaca	Montrose	Sample train operator/ Visible Emissions observer
Andy Vella	Montrose	Calculations and report preparation
John Browning	Bridgewater Group	Observer/Client Liaison/Test Coordinator
Steve Mortesen	Ecolube Recovery	Observer
Thomas Rhodes	Oregon DEQ	Observer

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

The Ecolube used oil facility consists of two distinct processes: PESCO Refinery and Base Oil. The Base Oil process itself has two separate components, Sulfonation and Oil Polishing. All three of these processes generate air emissions. These three emission streams are combined and routed into a single, 2-can natural gas-fired Regenerative Thermal Oxidizer (RTO) built by EPCON Systems. The Regenerative Thermal Oxidizer is capable of achieving > 97% destruction of VOCs or 3ppm VOC as propane outlet concentration if the inlet VOC as propane concentration is 100 ppm or less. The result is a single-point emission source for the Ecolube facility.

The PESCO refinery takes deliveries of lubricating oils and processes them to create VGO (Vacuum Gas Oil) as the main product. Secondary products are a Light End Distillate fuel, which is combusted on site in Oil Heater #3 to heat the refinery, and heavy oil flux, which is sold into the asphalt industry. The effluent from the PESCO refinery is routed through Oil Heater #3. The combustion exhaust gases from Oil Heater #3 are routed to the RTO for treatment.

VGO from the PESCO Refinery can then be run through part or all of the Base Oil process.

Sulfonation involves the reaction of the VGO from the refinery with sulfur trioxide (SO_3). Sulfur trioxide generated onsite (diluted in air to <2%v) is sent to an Annular Falling Film Reactor (AFFR), where it contacts and reacts with the VGO for the purpose of removing contaminants, color bearing agents and aromatic compounds in the form of sulfonic acid. The sulfonated material is a tarry, black liquid suspended in the oil and must be removed for the oil to become Group II. This is achieved in the Oil Polishing System.

The air effluent from the sulfonation plant (which will contain SO_2, SO_3, and variable but minuscule amounts of mercaptans) is sent through a preliminary treatment process. It first is routed through a packed column continuously flushed with dilute caustic soda (NaOH) which absorbs the SO_2. It is then sent through a constantly irrigated Brownian motion filter, where the SO_3 and any entrained oil is removed. Finally, the effluent containing relatively small amounts of VOCs is routed to the RTO for final treatment.

The Oil Polishing System has two distinct steps: (1) Sulfonic Separation, (2) Clay Filtration. The sulfonated material will be separated from the oil through two centrifuges installed in series. This material will be sent to the existing asphalt flux tank, where it can be combined and sold as a product. The Sulfonic Separation process is not a source of air emissions exhausted to the RTO.

The oil product from Sulfonic Separation is sent to the PESCO Beam Lube Polishing System (LPS). This system utilizes Bauxite filled columns which "polish" the oil, removing color bearing compounds. On a continuous basis various Bauxite columns are reactivated through thermal desorption.

The effluent from the thermal desorption process passes through a condensing heat exchanger. The majority of the desorbed material is recovered and recycled to the refinery feed tank and the remaining effluent is then sent to the RTO for treatment.

2.2 FLUE GAS SAMPLING LOCATIONS

Information regarding the sampling locations is presented in Table 2-1.

TABLE 2-1
SAMPLING LOCATIONS

		Distance from Nearest Disturbance		
Sampling Location	**Stack Inside Diameter (in.)**	**Downstream EPA "B" (in./dia.)**	**Upstream EPA "A" (in./dia.)**	**Number of Traverse Points**
RTO #1 Inlet	17.25	53 / 3.1	29 / 1.7	Flow: 16 (8/port); Gaseous: 1
RTO #1 Outlet	19.5	146 / 7.5	33 / 1.7	Isokinetic: 16 (8/port); Gaseous: 3

Sample locations were verified in the field to conform to EPA Method 1. Acceptable cyclonic flow conditions were confirmed prior to testing using EPA Method 1, Section 11.4. See Appendix A.1 for more information.

2.3 OPERATING CONDITIONS AND PROCESS DATA

Ecolube targeted the following process flow rates:

- PESCO Refinery = 14.5 GPM into Flash Tank
  - This is the nameplate capacity of the unit
- Sulfonation = 8 GPM
  - This is 70% of the nameplate capacity of the unit
  - This is 100% of the design capacity of the unit based on the output capacity of the PESCO refinery
- OPS = 8 GPM
  - This is 70% of the nameplate capacity of the unit
  - This is 100% of the design capacity of the unit based on the output capacity of the PESCO refinery

Plant personnel established the test conditions and collected all applicable unit-operating data. Data collected included the following parameters:

- Natural gas usage, scfh
- Operating temperature of the oxidizer
- Other normally recorded process information for the oxidizer system
- Quantity of oil processed thru PESCO refinery
- Flash point of the fuel for Oil Heater No. 3

- Type and quantity of fuel burned at Oil Heater No. 3
- Content of halogens, and PCB in the fuel for Oil Heater No. 3
- Quantity of oil process through the sulfonation system
- Quantity of oil processed through the oil polishing system

Process	**Parameter**	**Device**
Refinery	Flash Tank Feed Rate	Instrument (Trended in Control System)
	WFE-1 Feed Rate	Instrument (Trended in Control System)
	WFE-1 Vacuum	Instrument (Trended in Control System)
Sulfonation	Sulfur Flow Rate	Instrument (Trended in Control System)
	Oil Flow Rate	Instrument (Trended in Control System)
	Air Flow Rate	Instrument (Trended in Control System)
OPS	Train 1 Feed Rate	Instrument (Trended in Control System)
	Train 2 Feed Rate	Instrument (Trended in Control System)
	Reactivation Vacuum	Instrument (Trended in Control System)
RTO	Inlet Pressure	Instrument (Trended in Control System)
	Average Chamber Temp	Instrument (Trended in Control System)
	Exhaust Temperature	Instrument (Trended in Control System)

The Ecolube facility only processes lubrication type oils (e.g. motor oil, crank-case oil, etc.). The PESCO Refinery was fed out of Tank-12, which was filled with this type of oil.

The following products/byproducts were generated during the test:

- PESCO Refinery
  - Vacuum Gas Oil (VGO)
  - Light End Distillate
  - Process Water
  - Heavy Oil Flux
- Sulfonation
  - Sulfonated VGO
  - 98% H_2SO_4
  - Process Water
- OPS
  - GII Base Oil

- Sulfonated VGO Substrate

The PESCO refinery and SULFO-1/OPS-1 is a continuous process with intermediate tankage which can be used for hold-up volume in the event of a downstream process disruption.

- The PESCO Refinery generates VGO which is stored in tank IT100-1
- SULFO-1 is fed from IT100-1 and directly feeds the separation part of the OPS process (centrifuges)
- The oil coming out of the centrifuges is sent to the LPS feed tanks (TK10301/TK10302)
- The LPS sends the GII base oil to the product storage tanks (TK10401/TK10402/TK10403/TK10404)

As stated previously, Oil Heater #4 was decommissioned in February 2017 and completely demolished and removed from the site in 2018.

Process flow rates are discussed above.

The test conditions represent the maximum normal operating conditions of the Ecolube facility. These would be the “worst-case” conditions since their operation does not deviate from these conditions unless to run at a slower rate due to supply issues.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 TEST METHODS

The test methods for this test program were presented previously in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Stausscheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1. The molecular weight of the gas stream is determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate is calculated using the measured average velocity head, the area of the duct at the measurement plane, the measured average temperature, the measured duct static pressure, the molecular weight of the gas stream, and the measured moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - S-type pitot tube coefficient is 0.84
  - Inclined manometer was used to measure velocity

The typical sampling system is detailed in Figures 3-3 and 3-4.

3.1.3 EPA Method 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 3A is an instrumental test method used to measure the concentration of O_2 and CO_2 in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O_2 and CO_2. The performance requirements of the method must be met to validate data.

Pertinent information regarding the performance of the method is presented below:

- Method Options:

  - A Method 3 like single-point integrated sample is collected at the inlet of the RTO for molecular weight determination as part of the Method 4 train
  - If the stratification test provisions in section 8.1.2 of Method 7E are used to reduce the number of required sampling points, the alternative acceptance criterion for three-point sampling will be ±0.5 percent CO_2 or O_2, and the alternative acceptance criterion for single-point sampling will be ±0.3 percent CO_2 or O_2. In that case single-point integrated sampling as described in section 8.2.1 of Method 3 may be used
- Target and/or Minimum Required Sample Duration: 60/240 minutes

The typical sampling system is detailed in Figures 3-1 and 3-2.

FIGURE 3-1
US EPA METHOD 3A (TEDLAR BAG) SAMPLING TRAIN

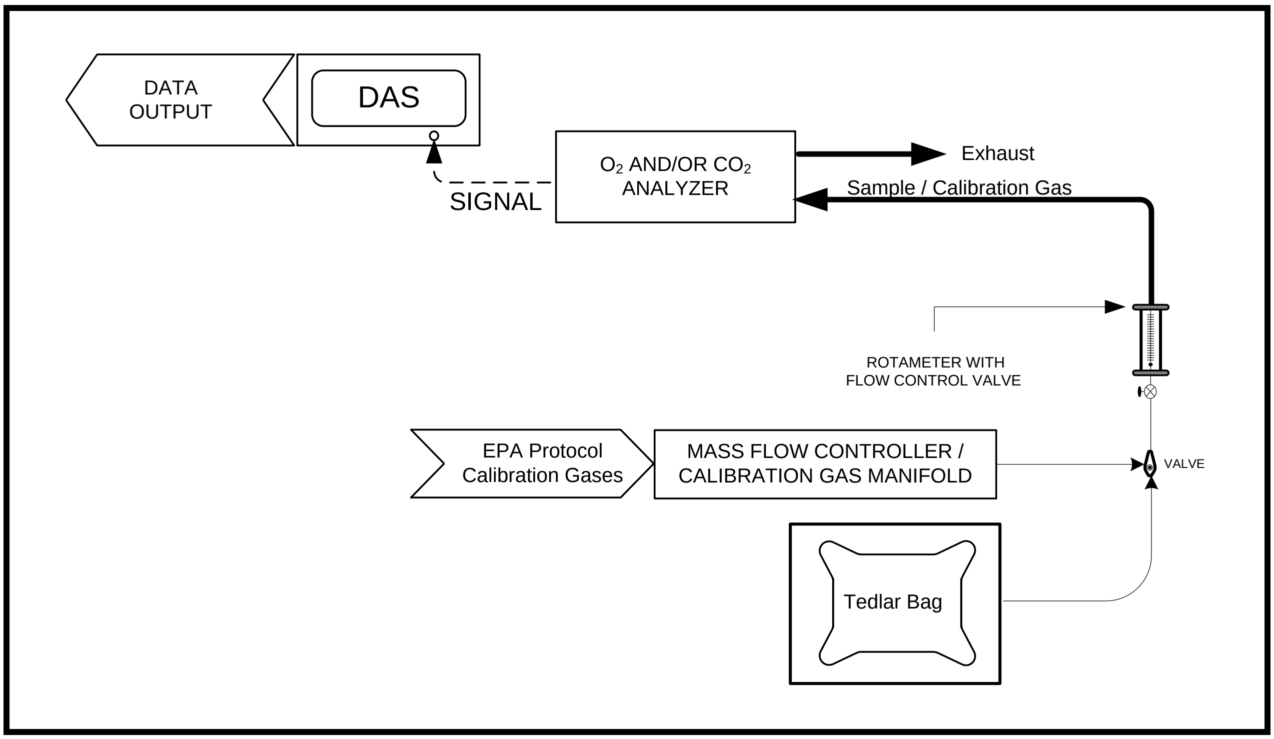
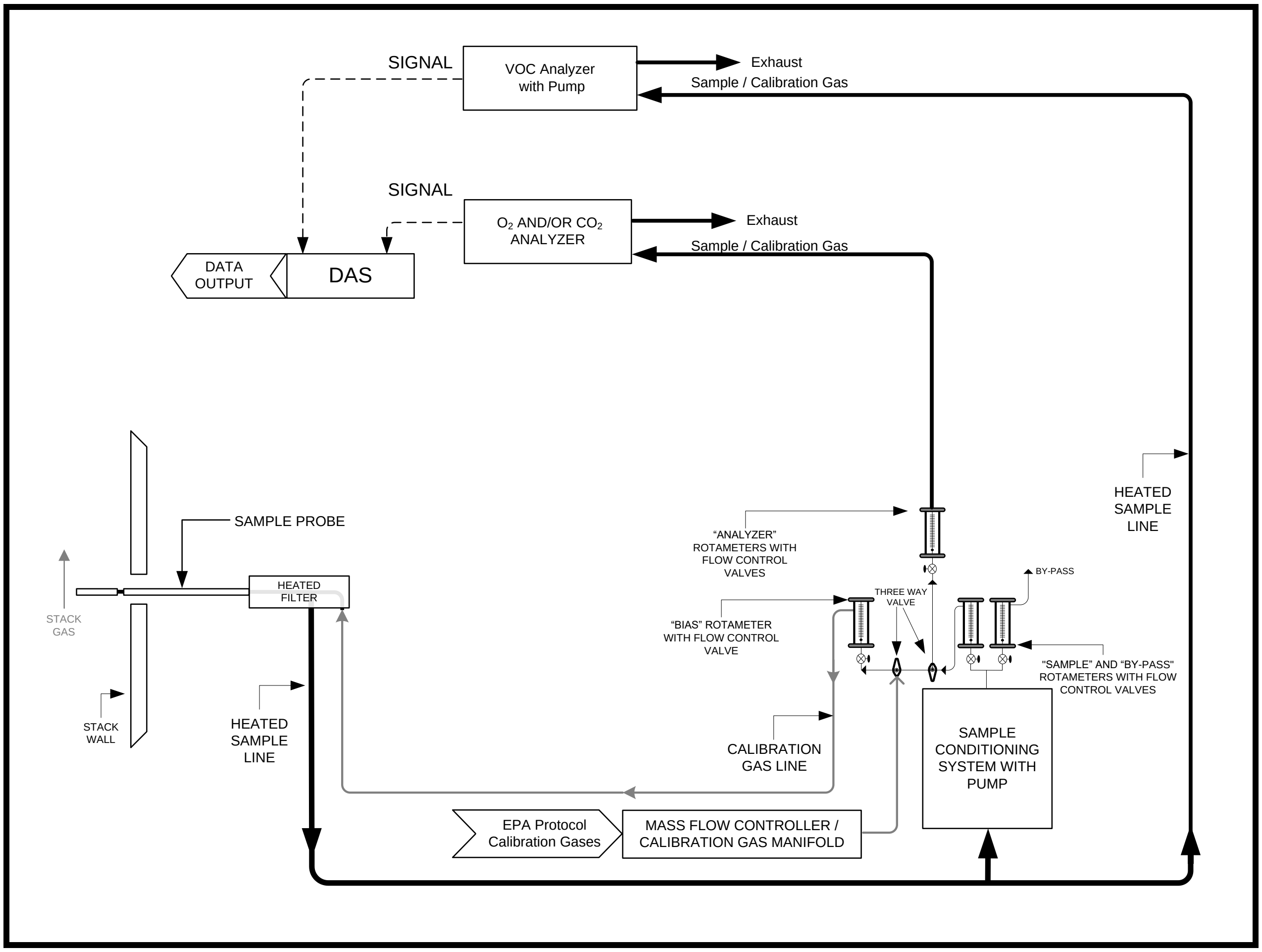


FIGURE 3-2
US EPA METHOD 3A AND 25A SAMPLING TRAIN



3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

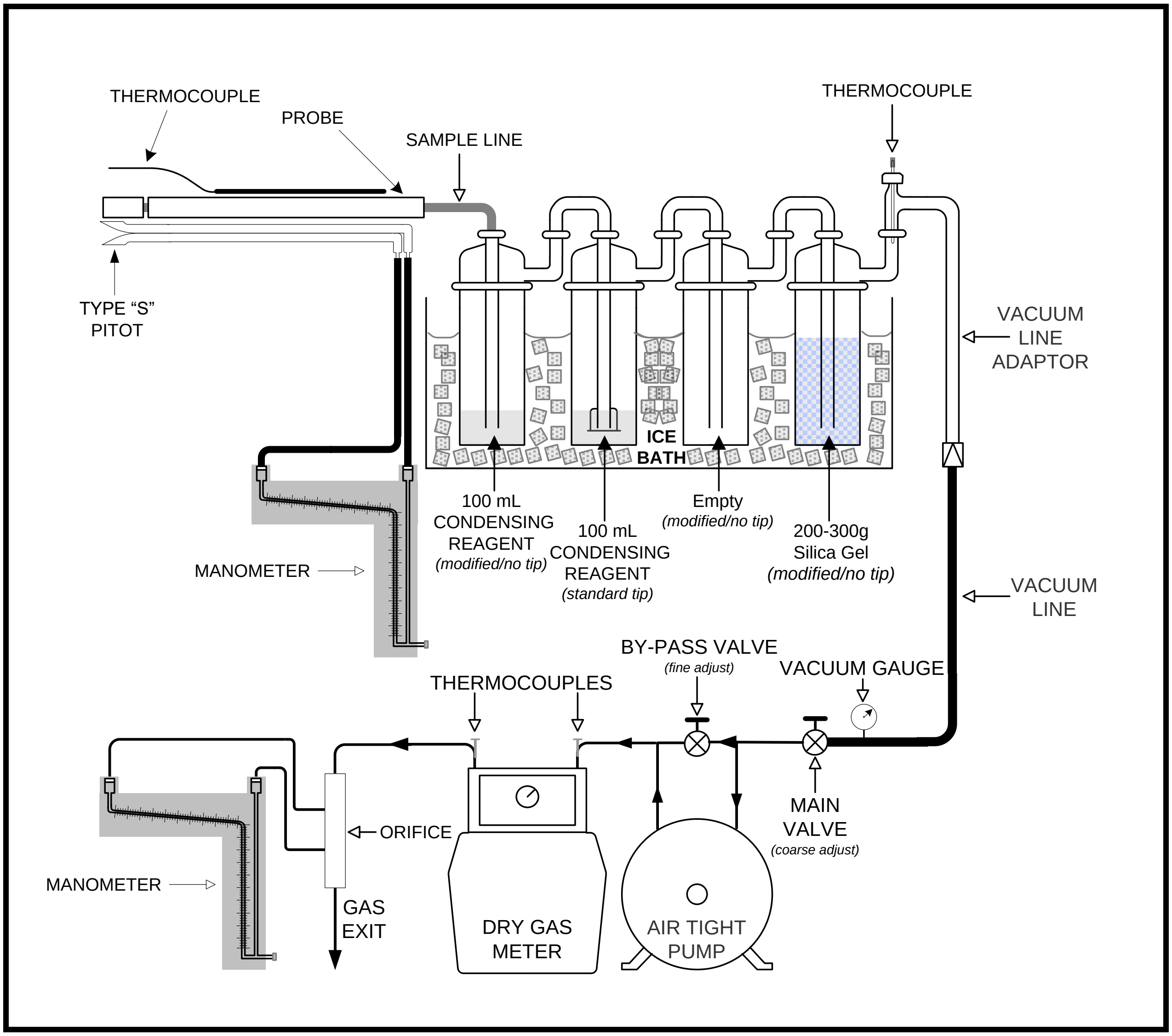
Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Condensed water is measured gravimetrically
  - Moisture sampling is performed as part of the pollutant sample trains at the outlet of the RTO
  - Since it is theoretically impossible for measured moisture to be higher than psychrometric moisture, the psychrometric moisture is also calculated, and the lower moisture value is used in the calculations

- Method Exceptions:
  - Moisture sampling is performed as a stand-alone method at a single point in the centroid of the stack at the inlet of the RTO utilizing an unheated probe
- Target and/or Minimum Required Sample Duration: 60/240 minutes
- Minimum Required Sample Volume: 21 scf

The typical sampling system is detailed in Figures 3-3 and 3-4.

FIGURE 3-3
US EPA METHOD 4 SAMPLING TRAIN



3.1.5 EPA Method 23, Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources

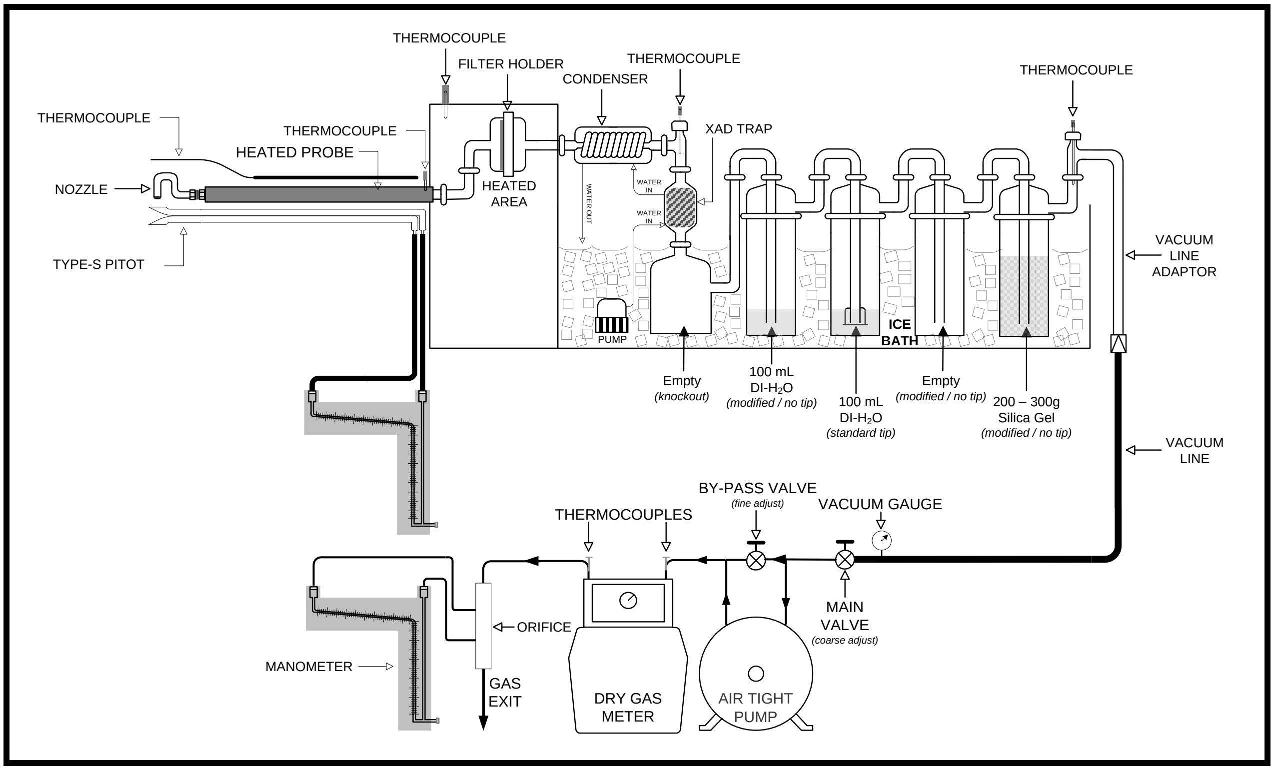
EPA Method 23 is a manual, isokinetic method to measure polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) emissions using high resolution gas chromatography with high resolution mass spectroscopy (HRGC/HRMS). The stack gas is sampled through a nozzle, probe, filter, sorbent trap module encased in a water-cooled condenser, and impinger train. Dioxin/furan emissions are reported in emission concentration and emission rate units.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
    - In accordance with recent proposed modifications to EPA Method 23, PCBs and PAHs are measured with dioxins/difurans
- Method Exceptions:
    - Acetone and toluene are used as the recovery solvents
- Target Analytes:
    - Each dioxin and furan congener, as well as totals for each class of congeners
    - Each PCB congener
    - Each PAH and PAH-derivative
    - Chlorobenzene and Chlorophenol
- Target and/or Minimum Required Sample Duration: 60/240 minutes
- Minimum Required Sample Volume: 21 scf

The typical sampling system is detailed in Figure 3-4.

FIGURE 3-4
US EPA METHOD 23 SAMPLING TRAIN



3.1.6 EPA Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

EPA Method 25A is an instrumental test method used to measure the concentration of THC in stack gas. A gas sample is extracted from the source through a heated sample line and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Results are reported in terms of propane ppmvd
- Method Exceptions: NA
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-2.

3.1.7 EPA Method 9, Visual Determination of the Opacity of Emissions

EPA Method 9 is used to observe the visual opacity of emissions (opacity). The observer stands at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to their back. The line of vision is perpendicular to the plume direction and does not include more than one plume diameter. Observations are recorded at 15-second intervals and are made to the nearest 5% opacity. The qualified observer is certified according to the requirements of EPA Method 9, section 3.1.

- Method Options:
  - Observations are attempted to be made 30 minutes before, during, or within 30 minutes after each concurrent particulate run, unless weather conditions are unfavorable.

3.1.8 EPA Method ALT-011, Alternative Method 2 Thermocouple Calibration

EPA Approved Alternative Method 011 (ALT-011) is used as an alternative to the EPA Method 2 two-point thermocouple calibration. This procedure involves a single-point in-field check using a reference thermometer to confirm that the thermocouple system is operating properly. The temperatures of the thermocouple and reference thermometers shall agree to within ±2 °F.

3.2 PROCESS TEST METHODS

The test plan did not require that process samples be collected during this test program; therefore, no process sample data are presented in this test report.

4.0 TEST DISCUSSION AND RESULTS

4.1 FIELD TEST DEVIATIONS AND EXCEPTIONS

The FID for the RTO Inlet lost pressure during the first run, possibly due to a faulty sample pump. The run was replaced by a fourth run. Oxygen and carbon dioxide data was recorded for the duration of the run but had to be recovered from the strip chart.

The third PCB/PAH run was paused at 18:24 due to a suspected clogged filter. The filter was replaced and the run restarted at 18:35.

Oxygen and carbon dioxide data used to calculate molecular weight at the RTO Outlet during EPA Method 23 testing was a weighted average of data from Montrose's data acquisition software (MAQDAQ) as well as from data recovered from the raw data strip chart which was recording even while MAQDAQ was not set to record a run. All O_2/CO_2 data is available in Appendix A.4.

4.2 PRESENTATION OF RESULTS

The average results are compared to the permit limits in Table 1-2. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-7. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

TABLE 4-1
VOC EMISSIONS RESULTS -
RTO INLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1720-1820	0927-1027	1441-1541	--
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	18.8	15.8	17.0	17.2
CO_2, % volume dry	2.0	4.0	3.3	3.1
flue gas temperature, °F	332	347	268	316
moisture content, % volume	1.2	2.6	2.8	2.2
volumetric flow rate, dscfm	2,589	2,537	2,611	2,579
Total Hydrocarbons, as Propane (VOC)				
ppmvd	193	329	471	331
lb/hr	3.43	5.73	8.45	5.87

TABLE 4-2
VOC EMISSIONS RESULTS -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1720-1820	0927-1027	1441-1541	--
Sampling & Flue Gas Parameters				
sample duration, minutes	60	60	60	--
O_2, % volume dry	14.6	13.4	13.1	13.7
CO_2, % volume dry	4.7	5.6	5.8	5.3
flue gas temperature, °F	404	405	393	401
moisture content, % volume	5.0	5.7	5.3	5.3
volumetric flow rate, dscfm	2,927	2,677	2,805	2,803
Total Hydrocarbons, as Propane (VOC)				
ppmvd	13.5	22.0	27.6	21.0
lb/hr	0.271	0.404	0.532	0.402
destruction efficiency, %	92.1	93.0	93.7	92.9

TABLE 4-3
DIOXIN/FURAN EMISSIONS RESULTS -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Sampling & Flue Gas Parameters				
sample duration, minutes	240	240	240	--
sample volume, dscf	181.3	171.4	171.4	174.7
isokinetic rate, %	98	101	96	--
O_2, % volume dry	14.4	13.1	13.7	13.7
CO_2, % volume dry	4.8	5.7	4.2	4.9
flue gas temperature, °F	404	405	393	401
moisture content, % volume	5.0	5.7	5.3	5.3
volumetric flow rate, dscfm	2,927	2,676	2,816	2,806
2378-Cl4-Dibenzo-p-dioxin				
ng/dscm	$<7.56 \times 10^{-4}$	$<8.07 \times 10^{-4}$	$<8.86 \times 10^{-4}$	$<8.16 \times 10^{-4}$
lb/hr	$<8.28 \times 10^{-12}$	$<8.09 \times 10^{-12}$	$<9.33 \times 10^{-12}$	$<8.57 \times 10^{-12}$
12378-Cl5-Dibenzo-p-dioxin				
ng/dscm	$<1.10 \times 10^{-3}$	$<1.31 \times 10^{-3}$	$<1.33 \times 10^{-3}$	$<1.25 \times 10^{-3}$
lb/hr	$<1.21 \times 10^{-11}$	$<1.31 \times 10^{-11}$	$<1.40 \times 10^{-11}$	$<1.31 \times 10^{-11}$
123478-Cl6-Dibenzo-p-dioxin				
ng/dscm	$<1.08 \times 10^{-3}$	$<9.06 \times 10^{-4}$	$<1.03 \times 10^{-3}$	$<1.01 \times 10^{-3}$
lb/hr	$<1.19 \times 10^{-11}$	$<9.08 \times 10^{-12}$	$<1.09 \times 10^{-11}$	$<1.06 \times 10^{-11}$
123678-Cl6-Dibenzo-p-dioxin				
ng/dscm	$<1.13 \times 10^{-3}$	$<9.00 \times 10^{-4}$	$<1.04 \times 10^{-3}$	$<1.02 \times 10^{-3}$
lb/hr	$<1.24 \times 10^{-11}$	$<9.02 \times 10^{-12}$	$<1.10 \times 10^{-11}$	$<1.08 \times 10^{-11}$
123789-Cl6-Dibenzo-p-dioxin				
ng/dscm	$<1.04 \times 10^{-3}$	$<8.36 \times 10^{-4}$	$<1.08 \times 10^{-3}$	$<9.87 \times 10^{-4}$
lb/hr	$<1.14 \times 10^{-11}$	$<8.38 \times 10^{-12}$	$<1.14 \times 10^{-11}$	$<1.04 \times 10^{-11}$
1234678-Cl7-Dibenzo-p-dioxin				
ng/dscm	1.53×10^{-2}	1.29×10^{-2}	1.57×10^{-2}	1.47×10^{-2}
lb/hr	1.68×10^{-10}	1.29×10^{-10}	1.66×10^{-10}	1.54×10^{-10}
12346789-Cl8-Dibenzo-p-dioxin				
ng/dscm	3.25×10^{-2}	3.28×10^{-2}	3.93×10^{-2}	3.49×10^{-2}
lb/hr	3.56×10^{-10}	3.28×10^{-10}	4.15×10^{-10}	3.66×10^{-10}
2378-Cl4-Dibenzofuran				
ng/dscm	1.41×10^{-2}	6.06×10^{-3}	$<7.7 \times 10^{-4}$	$<6.95 \times 10^{-3}$
lb/hr	1.54×10^{-10}	6.07×10^{-11}	$<7.45 \times 10^{-12}$	$<7.42 \times 10^{-11}$

TABLE 4-3
DIOXIN/FURAN EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	**1**	**2**	**3**	**Average**
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
12378-Cl5-Dibenzofuran				
ng/dscm	<9.60×10^{-4}	<7.00×10^{-4}	<8.07×10^{-4}	<8.23×10^{-4}
lb/hr	<1.05×10^{-11}	<7.01×10^{-12}	<8.51×10^{-12}	<8.68×10^{-12}
23478-Cl5-Dibenzofuran				
ng/dscm	<9.74×10^{-4}	<7.09×10^{-4}	<8.32×10^{-4}	<8.38×10^{-4}
lb/hr	<1.07×10^{-11}	<7.10×10^{-12}	<8.77×10^{-12}	<8.84×10^{-12}
123478-Cl6-Dibenzofuran				
ng/dscm	<6.10×10^{-4}	<5.91×10^{-4}	<5.97×10^{-4}	<5.99×10^{-4}
lb/hr	<6.68×10^{-12}	<5.92×10^{-12}	<6.29×10^{-12}	<6.30×10^{-12}
123678-Cl6-Dibenzofuran				
ng/dscm	<6.04×10^{-4}	<5.71×10^{-4}	<5.85×10^{-4}	<5.86×10^{-4}
lb/hr	<6.61×10^{-12}	<5.71×10^{-12}	<6.16×10^{-12}	<6.16×10^{-12}
234678-Cl6-Dibenzofuran				
ng/dscm	<5.82×10^{-4}	<5.38×10^{-4}	<5.77×10^{-4}	<5.66×10^{-4}
lb/hr	<6.38×10^{-12}	<5.38×10^{-12}	<6.08×10^{-12}	<5.95×10^{-12}
123789-Cl6-Dibenzofuran				
ng/dscm	<6.87×10^{-4}	<6.49×10^{-4}	<6.47×10^{-4}	<6.61×10^{-4}
lb/hr	<7.53×10^{-12}	<6.50×10^{-12}	<6.82×10^{-12}	<6.95×10^{-12}
1234678-Cl7-Dibenzofuran				
ng/dscm	<5.20×10^{-4}	<6.18×10^{-4}	<7.97×10^{-4}	<6.45×10^{-4}
lb/hr	<5.69×10^{-12}	<6.19×10^{-12}	<8.40×10^{-12}	<6.76×10^{-12}
1234789-Cl7-Dibenzofuran				
ng/dscm	<5.59×10^{-4}	<7.29×10^{-4}	<1.05×10^{-3}	<7.80×10^{-4}
lb/hr	<6.12×10^{-12}	<7.30×10^{-12}	<1.11×10^{-11}	<8.17×10^{-12}
12346789-Cl8-Dibenzofuran				
ng/dscm	<1.38×10^{-3}	<1.01×10^{-3}	<1.17×10^{-3}	<1.19×10^{-3}
lb/hr	<1.52×10^{-11}	<1.01×10^{-11}	<1.24×10^{-11}	<1.25×10^{-11}
Total Cl4-Dibenzo-p-dioxins				
ng/dscm	3.93×10^{-2}	3.73×10^{-3}	1.99×10^{-3}	1.50×10^{-2}
lb/hr	4.31×10^{-10}	3.73×10^{-11}	2.10×10^{-11}	1.63×10^{-10}

TABLE 4-3
DIOXIN/FURAN EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Total Cl5-Dibenzo-p-dioxins				
ng/dscm	1.51×10^{-2}	2.27×10^{-3}	$<1.33 \times 10^{-3}$	$<6.24 \times 10^{-3}$
lb/hr	1.66×10^{-10}	2.27×10^{-11}	$<1.40 \times 10^{-11}$	$<6.75 \times 10^{-11}$
Total Cl6-Dibenzo-p-dioxins				
ng/dscm	1.46×10^{-2}	9.00×10^{-3}	7.13×10^{-3}	1.03×10^{-2}
lb/hr	1.60×10^{-10}	9.02×10^{-11}	7.51×10^{-11}	1.08×10^{-10}
Total Cl7-Dibenzo-p-dioxins				
ng/dscm	2.84×10^{-2}	2.25×10^{-2}	2.90×10^{-2}	2.66×10^{-2}
lb/hr	3.11×10^{-10}	2.25×10^{-10}	3.06×10^{-10}	2.81×10^{-10}
Total Cl8-Dibenzo-p-dioxins				
ng/dscm	3.25×10^{-2}	3.28×10^{-2}	3.93×10^{-2}	3.49×10^{-2}
lb/hr	3.56×10^{-10}	3.28×10^{-10}	4.15×10^{-10}	3.66×10^{-10}
Total Cl4-Dibenzofurans				
ng/dscm	3.19×10^{-2}	1.20×10^{-2}	$<7.07 \times 10^{-4}$	$<1.49 \times 10^{-2}$
lb/hr	3.50×10^{-10}	1.20×10^{-10}	$<7.45 \times 10^{-12}$	$<1.59 \times 10^{-10}$
Total Cl5-Dibenzofurans				
ng/dscm	$<9.66 \times 10^{-4}$	$<7.04 \times 10^{-4}$	$<8.20 \times 10^{-4}$	$<8.30 \times 10^{-4}$
lb/hr	$<1.06 \times 10^{-11}$	$<7.06 \times 10^{-12}$	$<8.64 \times 10^{-12}$	$<8.76 \times 10^{-12}$
Total Cl6-Dibenzofurans				
ng/dscm	$<6.21 \times 10^{-4}$	$<5.87 \times 10^{-4}$	$<6.01 \times 10^{-4}$	$<6.03 \times 10^{-4}$
lb/hr	$<6.80 \times 10^{-12}$	$<5.88 \times 10^{-12}$	$<6.34 \times 10^{-12}$	$<6.34 \times 10^{-12}$
Total Cl7-Dibenzofurans				
ng/dscm	$<5.39 \times 10^{-4}$	$<6.74 \times 10^{-4}$	$<9.23 \times 10^{-4}$	$<7.12 \times 10^{-4}$
lb/hr	$<5.91 \times 10^{-12}$	$<6.75 \times 10^{-12}$	$<9.72 \times 10^{-12}$	$<7.46 \times 10^{-12}$
Total Cl8-Dibenzofurans				
ng/dscm	$<1.38 \times 10^{-3}$	$<1.01 \times 10^{-3}$	$<1.17 \times 10^{-3}$	$<1.19 \times 10^{-3}$
lb/hr	$<1.52 \times 10^{-11}$	$<1.01 \times 10^{-11}$	$<1.24 \times 10^{-11}$	$<1.25 \times 10^{-11}$
Total PCDD				
ng/dscm	$<1.30 \times 10^{-1}$	$<7.02 \times 10^{-2}$	$<7.88 \times 10^{-2}$	$<9.30 \times 10^{-2}$
lb/hr	$<1.42 \times 10^{-9}$	$<7.03 \times 10^{-10}$	$<8.31 \times 10^{-10}$	$<9.86 \times 10^{-10}$

TABLE 4-3
DIOXIN/FURAN EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Total PCDF				
ng/dscm	$<3.54 \times 10^{-2}$	$<1.49 \times 10^{-2}$	$<4.22 \times 10^{-3}$	$<1.82 \times 10^{-3}$
lb/hr	$<3.88 \times 10^{-10}$	$<1.50 \times 10^{-10}$	$<4.45 \times 10^{-11}$	$<1.94 \times 10^{-10}$
Total Dioxins/Furans				
ng/dscm	$<1.65 \times 10^{-1}$	$<8.51 \times 10^{-2}$	$<8.31 \times 10^{-2}$	$<1.11 \times 10^{-1}$
lb/hr	$<1.81 \times 10^{-9}$	$<8.53 \times 10^{-10}$	$<8.75 \times 10^{-10}$	$<1.18 \times 10^{-9}$

TABLE 4-4
PAH EMISSIONS RESULTS -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Sampling & Flue Gas Parameters				
sample duration, minutes	240	240	240	--
sample volume, dscf	181.3	171.4	171.4	174.7
isokinetic rate, %	98	101	96	--
O_2, % volume dry	14.4	13.1	13.7	13.7
CO_2, % volume dry	4.8	5.7	4.2	4.9
flue gas temperature, °F	404	405	393	401
moisture content, % volume	5.0	5.7	5.3	5.3
volumetric flow rate, dscfm	2,927	2,676	2,816	2,806
Naphthalene				
ng/dscm	2.06×10^{4}	3.34×10^{4}	2.68×10^{4}	2.69×10^{4}
lb/hr	2.26×10^{-4}	3.34×10^{-4}	2.82×10^{-4}	2.81×10^{-4}
2-Methylnaphthalene				
ng/dscm	1.99×10^{4}	2.20×10^{4}	1.95×10^{4}	2.05×10^{4}
lb/hr	2.18×10^{-4}	2.21×10^{-4}	2.06×10^{-4}	2.15×10^{-4}
Acenaphthylene				
ng/dscm	5.28×10^{2}	4.51×10^{2}	5.38×10^{2}	5.05×10^{2}
lb/hr	5.78×10^{-6}	4.52×10^{-6}	5.67×10^{-6}	5.32×10^{-6}
Acenaphthene				
ng/dscm	2.14×10^{2}	1.75×10^{2}	2.24×10^{2}	2.05×10^{2}
lb/hr	2.35×10^{-6}	1.75×10^{-6}	2.37×10^{-6}	2.15×10^{-6}
Fluorene				
ng/dscm	1.05×10^{3}	6.61×10^{2}	8.44×10^{2}	8.52×10^{2}
lb/hr	1.15×10^{-5}	6.62×10^{-6}	8.90×10^{-6}	9.01×10^{-6}
Phenanthrene				
ng/dscm	3.10×10^{3}	1.94×10^{3}	2.37×10^{3}	2.47×10^{3}
lb/hr	3.39×10^{-5}	1.94×10^{-5}	2.50×10^{-5}	2.61×10^{-5}
Anthracene				
ng/dscm	4.32×10^{2}	$<2.12 \times 10^{0}$	3.83×10^{2}	$<2.72 \times 10^{2}$
lb/hr	4.74×10^{-6}	$<2.13 \times 10^{-8}$	4.04×10^{-6}	$<2.93 \times 10^{-6}$

TABLE 4-4
PAH EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Fluoranthene (CCC)				
ng/dscm	7.89×10^{2}	3.95×10^{2}	6.98×10^{2}	6.27×10^{2}
lb/hr	8.64×10^{-6}	3.96×10^{-6}	7.36×10^{-6}	6.65×10^{-6}
Pyrene				
ng/dscm	5.84×10^{2}	1.82×10^{2}	4.84×10^{2}	4.17×10^{2}
lb/hr	6.40×10^{-6}	1.82×10^{-6}	5.10×10^{-6}	4.44×10^{-6}
Benzo(a)anthracene				
ng/dscm	1.88×10^{2}	6.47×10^{1}	1.77×10^{2}	1.43×10^{2}
lb/hr	2.06×10^{-6}	6.48×10^{-7}	1.86×10^{-6}	1.52×10^{-6}
Chrysene				
ng/dscm	2.36×10^{2}	1.68×10^{2}	2.41×10^{2}	2.15×10^{2}
lb/hr	2.58×10^{-6}	1.68×10^{-6}	2.54×10^{-6}	2.27×10^{-6}
Benzo(b)fluoranthene				
ng/dscm	8.08×10^{1}	4.74×10^{1}	8.65×10^{1}	7.16×10^{1}
lb/hr	8.85×10^{-7}	4.75×10^{-7}	9.12×10^{-7}	7.57×10^{-7}
Benzo(k)fluoranthene				
ng/dscm	1.64×10^{1}	1.11×10^{1}	1.43×10^{1}	1.40×10^{1}
lb/hr	1.80×10^{-7}	1.11×10^{-7}	1.51×10^{-7}	1.47×10^{-7}
Benzo(e)pyrene				
ng/dscm	2.04×10^{1}	9.45×10^{0}	2.27×10^{1}	1.75×10^{1}
lb/hr	2.24×10^{-7}	9.47×10^{-8}	2.39×10^{-7}	1.86×10^{-7}
Benzo(a)pyrene (CCC)				
ng/dscm	4.91×10^{0}	2.27×10^{0}	1.71×10^{0}	2.96×10^{0}
lb/hr	5.37×10^{-8}	2.27×10^{-8}	1.80×10^{-8}	3.15×10^{-8}
Perylene				
ng/dscm	$<2.02 \times 10^{0}$	$<2.68 \times 10^{0}$	$<5.31 \times 10^{0}$	$<3.34 \times 10^{0}$
lb/hr	$<2.22 \times 10^{-8}$	$<2.68 \times 10^{-8}$	$<5.60 \times 10^{-8}$	$<3.50 \times 10^{-8}$
Indeno(1,2,3-cd) pyrene				
ng/dscm	$<1.86 \times 10^{0}$	$<2.43 \times 10^{0}$	$<2.37 \times 10^{0}$	$<2.22 \times 10^{0}$
lb/hr	$<2.03 \times 10^{-8}$	$<2.43 \times 10^{-8}$	$<2.50 \times 10^{-8}$	$<2.32 \times 10^{-8}$

TABLE 4-4
PAH EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Dibenz(a,h) anthracene				
ng/dscm	$<2.01 \times 10^{0}$	$<2.35 \times 10^{0}$	$<1.97 \times 10^{0}$	$<2.11 \times 10^{0}$
lb/hr	$<2.20 \times 10^{-8}$	$<2.35 \times 10^{-8}$	$<2.08 \times 10^{-8}$	$<2.21 \times 10^{-8}$
Benzo(g,h,i) perylene				
ng/dscm	6.44×10^{0}	8.88×10^{0}	1.40×10^{1}	9.77×10^{0}
lb/hr	7.06×10^{-8}	8.89×10^{-8}	1.47×10^{-7}	1.02×10^{-7}
Total PAH Suite[1]				
ng/dscm	$<4.77 \times 10^{4}$	$<5.95 \times 10^{4}$	$<5.24 \times 10^{4}$	$<5.32 \times 10^{4}$
lb/hr	$<5.23 \times 10^{-4}$	$<5.96 \times 10^{-4}$	$<5.52 \times 10^{-4}$	$<5.57 \times 10^{-4}$

1 Calculated using ½ the DL for compounds that were found to be below the analytical detection limit

TABLE 4-5
PCB EMISSIONS RESULTS -
RTO OUTLET

Run Number	**1**	**2**	**3**	**Average**
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Sampling & Flue Gas Parameters				
sample duration, minutes	240	240	240	--
sample volume, dscf	181.3	171.4	171.4	174.7
isokinetic rate, %	98	101	96	--
O_2, % volume dry	14.4	13.1	13.7	13.7
CO_2, % volume dry	4.8	5.7	4.2	4.9
flue gas temperature, °F	404	405	393	401
moisture content, % volume	5.0	5.7	5.3	5.3
volumetric flow rate, dscfm	2,927	2,676	2,816	2,806
PCB-5/8 [2,4'-DiCB]				
ng/dscm	2.69×10^{0}	4.57×10^{-1}	1.88×10^{-1}	1.11×10^{0}
lb/hr	2.94×10^{-8}	4.58×10^{-9}	1.98×10^{-9}	1.20×10^{-8}
PCB-18 [2,2',5-TrCB]				
ng/dscm	1.89×10^{0}	1.99×10^{-1}	1.13×10^{-1}	7.33×10^{-1}
lb/hr	2.07×10^{-8}	1.99×10^{-9}	1.19×10^{-9}	7.95×10^{-9}
PCB-28 [2,4,4'-TrCB]				
ng/dscm	1.52×10^{0}	2.53×10^{-1}	9.04×10^{-2}	6.22×10^{-1}
lb/hr	1.67×10^{-8}	2.54×10^{-9}	9.53×10^{-10}	6.72×10^{-9}
PCB-44 [2,2',3,5'-TeCB]				
ng/dscm	6.46×10^{-1}	5.46×10^{-2}	4.24×10^{-2}	2.48×10^{-1}
lb/hr	7.08×10^{-9}	5.47×10^{-10}	4.47×10^{-10}	2.69×10^{-9}
PCB-52/69 [2,2',5,5'-TeCB]				
ng/dscm	6.62×10^{-1}	7.13×10^{-2}	4.70×10^{-2}	2.60×10^{-1}
lb/hr	7.25×10^{-9}	7.14×10^{-10}	4.95×10^{-10}	2.82×10^{-9}
PCB-66/76 [2,3',4,4'-TeCB]				
ng/dscm	3.15×10^{-1}	3.44×10^{-2}	2.37×10^{-2}	1.25×10^{-1}
lb/hr	3.46×10^{-9}	3.45×10^{-10}	2.50×10^{-10}	1.35×10^{-9}
PCB-77 [3,3',4,4'-TeCB]				
ng/dscm	3.37×10^{-2}	$<8.47 \times 10^{-3}$	$<3.95 \times 10^{-3}$	$<1.54 \times 10^{-2}$
lb/hr	3.69×10^{-10}	$<8.48 \times 10^{-11}$	$<4.17 \times 10^{-11}$	$<1.65 \times 10^{-10}$
PCB-81 [3,4,4',5-TeCB]				
ng/dscm	2.82×10^{-3}	$<9.64 \times 10^{-4}$	$<1.28 \times 10^{-3}$	$<1.69 \times 10^{-3}$
lb/hr	3.09×10^{-11}	$<9.66 \times 10^{-12}$	$<1.35 \times 10^{-11}$	$<1.80 \times 10^{-11}$

TABLE 4-5
PCB EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
PCB-90 [2,2',4,5,5'-PeCB]				
ng/dscm	3.06×10^{-1}	3.73×10^{-2}	3.77×10^{-2}	1.27×10^{-1}
lb/hr	3.35×10^{-9}	3.73×10^{-10}	3.97×10^{-10}	1.37×10^{-9}
PCB-105 [2,3,3',4,4'-PeCB]				
ng/dscm	6.91×10^{-2}	1.12×10^{-2}	1.03×10^{-2}	3.02×10^{-2}
lb/hr	7.57×10^{-10}	1.13×10^{-10}	1.09×10^{-10}	3.26×10^{-10}
PCB-106/118 [2,3',4,4',5-PeCB]				
ng/dscm	1.84×10^{-1}	$<2.37 \times 10^{-2}$	2.24×10^{-2}	$<7.67 \times 10^{-2}$
lb/hr	2.02×10^{-9}	$<2.37 \times 10^{-10}$	2.37×10^{-10}	$<8.30 \times 10^{-10}$
PCB-114 [2,3,4,4',5-PeCB]				
ng/dscm	$<3.27 \times 10^{-3}$	$<1.68 \times 10^{-3}$	$<1.71 \times 10^{-3}$	$<2.22 \times 10^{-3}$
lb/hr	$<3.58 \times 10^{-11}$	$<1.69 \times 10^{-11}$	$<1.80 \times 10^{-11}$	$<2.36 \times 10^{-11}$
PCB-123 [2',3,4,4',5-PeCB]				
ng/dscm	4.67×10^{-3}	$<1.21 \times 10^{-3}$	$<1.20 \times 10^{-3}$	$<2.36 \times 10^{-3}$
lb/hr	5.12×10^{-11}	$<1.22 \times 10^{-11}$	$<1.26 \times 10^{-11}$	$<2.53 \times 10^{-11}$
PCB-126 [3,3',4,4',5-PeCB]				
ng/dscm	$<3.58 \times 10^{-3}$	$<1.74 \times 10^{-3}$	$<1.87 \times 10^{-3}$	$<2.40 \times 10^{-3}$
lb/hr	$<3.92 \times 10^{-11}$	$<1.75 \times 10^{-11}$	$<1.97 \times 10^{-11}$	$<2.55 \times 10^{-11}$
PCB-128/162 [2,2',3,3',4,4'-HxCB]				
ng/dscm	1.62×10^{-2}	$<2.53\times 10^{-3}$	$<2.72 \times 10^{-3}$	$<7.16 \times 10^{-3}$
lb/hr	1.78×10^{-10}	$<2.54 \times 10^{-11}$	$<2.87 \times 10^{-11}$	$<7.73 \times 10^{-11}$
PCB-138/163/164 [2,2',3,4,4',5'-HxCB]				
ng/dscm	1.13×10^{-1}	2.00×10^{-2}	2.10×10^{-2}	5.14×10^{-2}
lb/hr	1.24×10^{-9}	2.00×10^{-10}	2.21×10^{-10}	5.54×10^{-10}
PCB-153 [2,2',4,4',5,5'-HxCB]				
ng/dscm	1.07×10^{-1}	1.58×10^{-2}	$<1.57 \times 10^{-2}$	$<4.62 \times 10^{-2}$
lb/hr	1.17×10^{-9}	1.59×10^{-10}	$<1.65 \times 10^{-10}$	$<4.99 \times 10^{-10}$
PCB-156 [2,3,3',4,4',5-HxCB]				
ng/dscm	1.03×10^{-2}	$<2.14 \times 10^{-3}$	$<2.76 \times 10^{-3}$	$<5.05 \times 10^{-3}$
lb/hr	1.12×10^{-10}	$<2.15 \times 10^{-11}$	$<2.91 \times 10^{-11}$	$<5.43 \times 10^{-11}$

TABLE 4-5
PCB EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
PCB-157 [2,3,3',4,4',5'-HxCB]				
ng/dscm	$<2.39 \times 10^{-3}$	$<2.33 \times 10^{-3}$	$<2.68 \times 10^{-3}$	$<2.47 \times 10^{-3}$
lb/hr	$<2.62 \times 10^{-11}$	$<2.33 \times 10^{-11}$	$<2.82 \times 10^{-11}$	$<2.59 \times 10^{-11}$
PCB-167 [2,3',4,4',5,5'-HxCB]				
ng/dscm	$<2.10 \times 10^{-3}$	$<2.06 \times 10^{-3}$	$<2.31 \times 10^{-3}$	$<2.16 \times 10^{-3}$
lb/hr	$<2.30 \times 10^{-11}$	$<2.06 \times 10^{-11}$	$<2.43 \times 10^{-11}$	$<2.27 \times 10^{-11}$
PCB-169 [3,3',4,4',5,5'-HxCB]				
ng/dscm	$<3.62 \times 10^{-3}$	$<3.05 \times 10^{-3}$	$<3.50 \times 10^{-3}$	$<3.39 \times 10^{-3}$
lb/hr	$<3.97 \times 10^{-11}$	$<3.05 \times 10^{-11}$	$<3.69 \times 10^{-11}$	$<3.57 \times 10^{-11}$
PCB-170 [2,2',3,3',4,4',5-HpCB]				
ng/dscm	1.21×10^{-2}	$<2.49 \times 10^{-3}$	$<3.93 \times 10^{-3}$	$<6.19 \times 10^{-3}$
lb/hr	1.33×10^{-10}	$<2.50 \times 10^{-11}$	$<4.15 \times 10^{-11}$	$<6.64 \times 10^{-11}$
PCB-180 [2,2',3,4,4',5,5'-HpCB]				
ng/dscm	3.31×10^{-2}	1.12×10^{-2}	$<1.46 \times 10^{-2}$	$<1.96 \times 10^{-2}$
lb/hr	3.63×10^{-10}	1.12×10^{-10}	$<1.54 \times 10^{-10}$	$<2.10 \times 10^{-10}$
PCB-182/187 [2,2',3,4',5,5',6-HpCB]				
ng/dscm	$<1.87 \times 10^{-2}$	$<4.88 \times 10^{-3}$	$<1.91 \times 10^{-3}$	$<8.50 \times 10^{-3}$
lb/hr	$<2.05 \times 10^{-10}$	$<4.89 \times 10^{-11}$	$<2.02 \times 10^{-11}$	$<9.13 \times 10^{-11}$
PCB-189 [2,3,3',4,4',5,5'-HpCB]				
ng/dscm	$<1.66 \times 10^{-3}$	$<2.95 \times 10^{-3}$	$<3.79 \times 10^{-3}$	$<2.80 \times 10^{-3}$
lb/hr	$<1.82 \times 10^{-11}$	$<2.95 \times 10^{-11}$	$<3.99 \times 10^{-11}$	$<2.92 \times 10^{-11}$
PCB-195 [2,2',3,3',4,4',5,6-OcCB]				
ng/dscm	$<3.21 \times 10^{-3}$	$<4.94 \times 10^{-3}$	$<6.06 \times 10^{-3}$	$<4.74 \times 10^{-3}$
lb/hr	$<3.52 \times 10^{-11}$	$<4.95 \times 10^{-11}$	$<6.38 \times 10^{-11}$	$<4.95 \times 10^{-11}$
PCB-206 [2,2',3,3',4,4',5,5',6-NoCB]				
ng/dscm	$<2.84 \times 10^{-3}$	$<6.84 \times 10^{-3}$	$<9.85 \times 10^{-3}$	$<6.51 \times 10^{-3}$
lb/hr	$<3.11 \times 10^{-11}$	$<6.85 \times 10^{-11}$	$<1.04 \times 10^{-10}$	$<6.78 \times 10^{-11}$
PCB-209 [2,2',3,3',4,4',5,5',6,6'-DeCB]				
ng/dscm	$<1.99 \times 10^{-3}$	$<3.65 \times 10^{-3}$	$<6.20 \times 10^{-3}$	$<3.94 \times 10^{-3}$
lb/hr	$<2.18 \times 10^{-11}$	$<3.65 \times 10^{-11}$	$<6.53 \times 10^{-11}$	$<4.12 \times 10^{-11}$

**TABLE 4-5
PCB EMISSIONS RESULTS CONTINUED -
RTO OUTLET**

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Total monoPCB				
ng/dscm	1.20×10^{0}	1.15×10^{0}	1.04×10^{0}	1.13×10^{0}
lb/hr	1.32×10^{-8}	1.15×10^{-8}	1.10×10^{-8}	1.19×10^{-8}
Total diPCB				
ng/dscm	7.01×10^{0}	1.60×10^{0}	6.94×10^{-1}	3.10×10^{0}
lb/hr	7.68×10^{-8}	1.60×10^{-8}	7.32×10^{-9}	3.34×10^{-8}
Total triPCB				
ng/dscm	9.93×10^{0}	1.39×10^{0}	6.47×10^{-1}	3.99×10^{0}
lb/hr	1.09×10^{-7}	1.39×10^{-8}	6.82×10^{-9}	4.32×10^{-8}
Total tetraPCB				
ng/dscm	6.15×10^{0}	4.86×10^{-1}	4.06×10^{-1}	2.35×10^{0}
lb/hr	6.74×10^{-8}	4.87×10^{-9}	4.28×10^{-9}	2.55×10^{-8}
Total pentaPCB				
ng/dscm	1.63×10^{0}	1.46×10^{-1}	1.53×10^{-1}	6.42×10^{-1}
lb/hr	1.78×10^{-8}	1.46×10^{-9}	1.61×10^{-9}	6.96×10^{-9}
Total hexaPCB				
ng/dscm	5.39×10^{-1}	6.38×10^{-2}	5.21×10^{-2}	2.18×10^{-1}
lb/hr	5.91×10^{-9}	6.40×10^{-10}	5.49×10^{-10}	2.37×10^{-9}
Total heptaPCB				
ng/dscm	9.60×10^{-2}	$<1.12 \times 10^{-2}$	$<1.79 \times 10^{-2}$	$<4.17 \times 10^{-2}$
lb/hr	1.05×10^{-9}	$<1.12 \times 10^{-10}$	$<1.88 \times 10^{-10}$	$<4.51 \times 10^{-10}$
Total octaPCB				
ng/dscm	4.17×10^{-3}	$<4.94 \times 10^{-3}$	$<6.06 \times 10^{-3}$	$<5.06 \times 10^{-3}$
lb/hr	4.56×10^{-11}	$<4.95 \times 10^{-11}$	$<6.38 \times 10^{-11}$	$<5.30 \times 10^{-11}$
Total nonaPCB				
ng/dscm	$<2.84 \times 10^{-3}$	$<6.84 \times 10^{-3}$	$<9.85 \times 10^{-3}$	$<6.51 \times 10^{-3}$
lb/hr	$<3.11 \times 10^{-11}$	$<6.85 \times 10^{-11}$	$<1.04 \times 10^{-10}$	$<6.78 \times 10^{-11}$
DecaCB				
ng/dscm	$<1.99 \times 10^{-3}$	$<3.65 \times 10^{-3}$	$<6.20 \times 10^{-3}$	$<3.94 \times 10^{-3}$
lb/hr	$<2.18 \times 10^{-11}$	$<3.65 \times 10^{-11}$	$<6.53 \times 10^{-11}$	$<4.12 \times 10^{-11}$

TABLE 4-5
PCB EMISSIONS RESULTS CONTINUED -
RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Total PCB				
ng/dscm	2.65×10^{1}	4.84×10^{0}	2.99×10^{0}	1.14×10^{1}
lb/hr	2.90×10^{-7}	4.85×10^{-8}	3.15×10^{-8}	1.23×10^{-7}

TABLE 4-6
CHLOROBENZENE/CHLOROPHENOL EMISSIONS RESULTS - RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
Sampling & Flue Gas Parameters				
sample duration, minutes	240	240	240	--
sample volume, dscf	181.3	171.4	171.4	174.7
isokinetic rate, %	98	101	96	--
O_2, % volume dry	14.4	13.1	13.7	13.7
CO_2, % volume dry	4.8	5.7	4.2	4.9
flue gas temperature, °F	404	405	393	401
moisture content, % volume	5.0	5.7	5.3	5.3
volumetric flow rate, dscfm	2,927	2,676	2,816	2,806
2-Chlorophenol				
ng/dscm	$<8.28 \times 10^{1}$	$<8.75 \times 10^{1}$	$<8.75 \times 10^{1}$	$<8.59 \times 10^{1}$
lb/hr	$<9.06 \times 10^{-7}$	$<8.77 \times 10^{-7}$	$<9.23 \times 10^{-7}$	$<9.02 \times 10^{-7}$
1,3-Dichlorobenzene				
ng/dscm	$<1.10 \times 10^{2}$	$<1.17 \times 10^{2}$	$<1.17 \times 10^{2}$	$<1.14 \times 10^{2}$
lb/hr	$<1.21 \times 10^{-6}$	$<1.17 \times 10^{-6}$	$<1.23 \times 10^{-6}$	$<1.20 \times 10^{-6}$
1,4-Dichlorobenzene (CCC)				
ng/dscm	$<1.83 \times 10^{2}$	$<1.94 \times 10^{2}$	$<1.94 \times 10^{2}$	$<1.90 \times 10^{2}$
lb/hr	$<2.00 \times 10^{-6}$	$<1.94 \times 10^{-6}$	$<2.04 \times 10^{-6}$	$<1.99 \times 10^{-6}$
1,2-Dichlorobenzene				
ng/dscm	$<2.08 \times 10^{2}$	$<2.20 \times 10^{2}$	$<2.20 \times 10^{2}$	$<2.16 \times 10^{2}$
lb/hr	$<2.28 \times 10^{-6}$	$<2.21 \times 10^{-6}$	$<2.32 \times 10^{-6}$	$<2.27 \times 10^{-6}$
2,4-Dichlorophenol				
ng/dscm	$<1.63 \times 10^{2}$	$<1.72 \times 10^{2}$	$<1.72 \times 10^{2}$	$<1.69 \times 10^{2}$
lb/hr	$<1.78 \times 10^{-6}$	$<1.72 \times 10^{-6}$	$<1.81 \times 10^{-6}$	$<1.77 \times 10^{-6}$
1,2,4-Trichlorophenol				
ng/dscm	$<1.40 \times 10^{2}$	$<1.48 \times 10^{2}$	$<1.48 \times 10^{2}$	$<1.46 \times 10^{2}$
lb/hr	$<1.54 \times 10^{-6}$	$<1.49 \times 10^{-6}$	$<1.56 \times 10^{-6}$	$<1.53 \times 10^{-6}$
2,4,6-Trichlorobenzene				
ng/dscm	$<1.64 \times 10^{2}$	$<1.73 \times 10^{2}$	$<1.73 \times 10^{2}$	$<1.70 \times 10^{2}$
lb/hr	$<1.80 \times 10^{-6}$	$<1.74 \times 10^{-6}$	$<1.83 \times 10^{-6}$	$<1.79 \times 10^{-6}$
2,4,5-Trichlorophenol				
ng/dscm	$<1.95 \times 10^{2}$	$<2.06 \times 10^{2}$	$<2.06 \times 10^{2}$	$<2.02 \times 10^{2}$
lb/hr	$<2.13 \times 10^{-6}$	$<2.06 \times 10^{-6}$	$<2.17 \times 10^{-6}$	$<2.12 \times 10^{-6}$

TABLE 4-6
CHLOROBENZENE/CHLOROPHENOL EMISSIONS RESULTS CONTINUED - RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1410-1827	0927-1339	1441-1905	--
2,3,4,6-Tetrachlorophenol				
ng/dscm	$<2.67 \times 10^{2}$	$<2.82 \times 10^{2}$	$<2.82 \times 10^{2}$	$<2.77 \times 10^{2}$
lb/hr	$<2.92 \times 10^{-6}$	$<2.83 \times 10^{-6}$	$<2.97 \times 10^{-6}$	$<2.91 \times 10^{-6}$
Hexachlorobenzene				
ng/dscm	$<2.49 \times 10^{2}$	$<2.64 \times 10^{2}$	$<2.64 \times 10^{2}$	$<2.59 \times 10^{2}$
lb/hr	$<2.73 \times 10^{-6}$	$<2.64 \times 10^{-6}$	$<2.78 \times 10^{-6}$	$<2.72 \times 10^{-6}$
Pentachlorophenol (CCC)				
ng/dscm	$<1.74 \times 10^{2}$	$<1.84 \times 10^{2}$	$<1.84 \times 10^{2}$	$<1.81 \times 10^{2}$
lb/hr	$<1.91 \times 10^{-6}$	$<1.84 \times 10^{-6}$	$<1.94 \times 10^{-6}$	$<1.90 \times 10^{-6}$

TABLE 4-7
VISIBLE EMISSIONS RESULTS - RTO OUTLET

Run Number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Time	1523-1529	1046-1052	1545-1551	--
Visible Emissions				
% opacity	0	0	0	0

5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA/QC AUDITS

The meter boxes and sampling trains used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, minimum sample durations, and percent isokinetics met the applicable QA/QC criteria.

EPA Method 3A calibration audits were all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks.

EPA Method 25A FIA calibration audits were within the measurement system performance specifications for the calibration drift checks and calibration error checks.

EPA Method 9 was performed by a certified Visible Emissions Evaluator. For quality assurance, the observer obtained a view of the emissions with the best available contrasting background and with the sun oriented in the 140° sector to their back. Readings were taken every 15 seconds and made to the nearest 5% opacity.

EPA Method 23 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met, except where noted in Section 5.2.

5.2 QA/QC DISCUSSION

Enthalpy Analytical's lab report for chlorobenzene and chlorophenol analysis states that surrogate analysis failed recovery criteria. All other QA/QC criteria were met.

5.3 QUALITY STATEMENT

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).

APPENDIX A
FIELD DATA AND CALCULATIONS

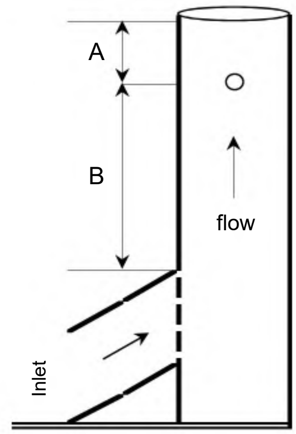
Appendix A.1
Sampling Locations

Ecolube Recovery / RTO Inlet

TRAVERSE POINT LAYOUT (NON-PARTICULATE)

CIRCULAR STACKS BETWEEN 12 AND 24 INCHES

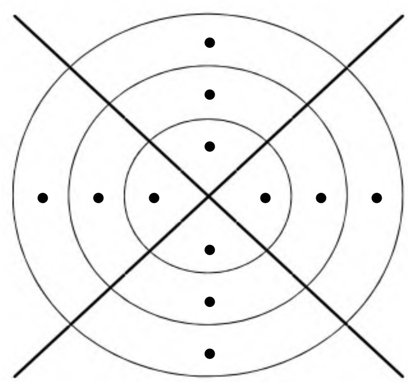
Stack diameter:	**17.3**	***inches***
Upstream diameter (A):	**29.0**	***inches***
Downstream diameter (B):	**53.0**	***inches***
Port length:	**7.00**	***inches***
Number of ports being used:	**2**	***see note***
Equivalent upstream diameter (A):	**1.681**	***Pass***
Equivalent downstream diameter (B):	**3.072**	***Pass***
All points at least 0.5" from stack wall:	**0.552**	***Pass***
Total points:	**16**	
Points per port:	**8**	



Typical vertical exhaust stack

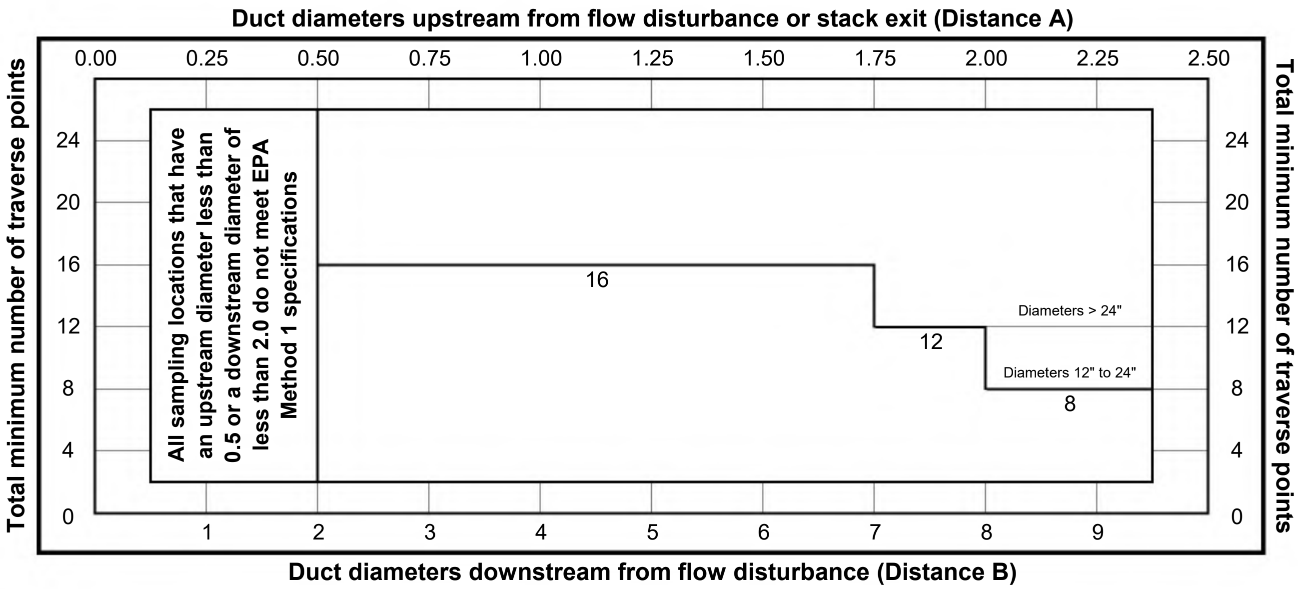
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	3.2	0.6	7.6
2	10.5	1.8	8.8
3	19.4	3.3	10.3
4	32.3	5.6	12.6
5	67.7	11.7	18.7
6	80.6	13.9	20.9
7	89.5	15.4	22.4
8	96.8	16.7	23.7
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

DUCT AREA = 1.623 ft^3



Example: Location of 12 points

Note: No traverse point shall be within 0.5" of the stack walls (see EPA 1 section 11.3.1). Points automatically adjusted to meet this criterion.



MONTROSE AIR QUALITY SERVICES

EPA METHOD 1 FIELD DATA

Project Information

Client / Facility	Ecolube	Date	1/26/22
Source / Location	RTO #1 IN	Data taken by	JU JCH

Circular/Elliptical Duct Measurements

	Port 1	Port 2	Port 3	Port 4
Far wall to outside of port distance, in.:	24.25	24.25		
Port length, in. (confirm flush with inside wall):	7.0	7.0		
Duct inner diameter, in.:	17.25	17.25		
Port diameter, in.:	3	3		
Upstream distance (A), in.:	29			
Downstream distance (B), in.:	53			
Number of ports (must be 90° to each other):	2			

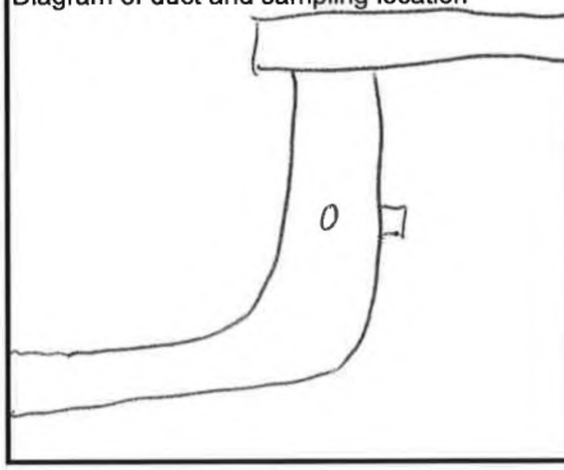
Duct Parameters

Material (steel, fiberglass, PVC)	steel
Type of port (flange, npt nipple, etc.)	nipple
Orientation (vertical, horizontal, if diagonal specify angle)	vert
Elevation of ports above ground, ft.	~6

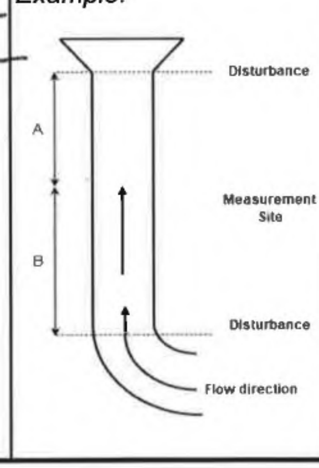
Cyclonic flow expected?	NO
Pitot ID	002TP3
Manometer ID	MB31
Angle finder / protractor ID	740

Traverse point	Outside port distance, in.	Null angle, α
1	7.9	1
2	9.1	1
3	10.6	0
4	12.9	2
5	14.0	1
6	21.2	4
7	22.7	1
8	24.0	1
1		2
2		5
3		6
4		5
5		4
6		2
7		2
8		0
Average of absolute α		2.3

Diagram of duct and sampling location

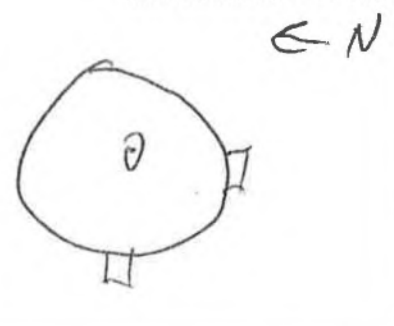


Example:

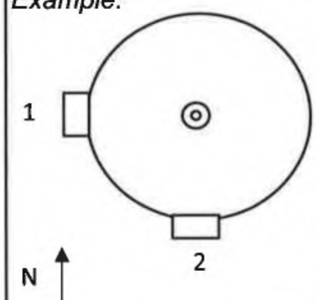


Cross-section sketch showing port locations and numbering

Label the following: port number 1, 2, etc.
north direction or other landmark
flow direction - ⊗ into page ⊙ out of page



Example:



*For stacks having diameters greater than 24 in., no traverse points shall be within 1.00 in. of the stack walls; and for stack diameters equal to or less than 24 in., no traverse points shall be located within 0.50 in. - EPA Method 1 section 11.3.1 & 11.3.2

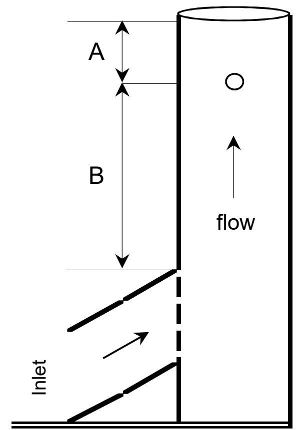
**If schematics are unavailable, internal width can be estimated by measuring the portion of the port length not visible on the outside of the duct, which would be an estimate of the insulation thickness. Double this distance and subtract it from the outside width.

Ecolube Recovery / RTO Outlet

TRAVERSE POINT LAYOUT (PARTICULATE)

CIRCULAR STACKS BETWEEN 12 AND 24 INCHES

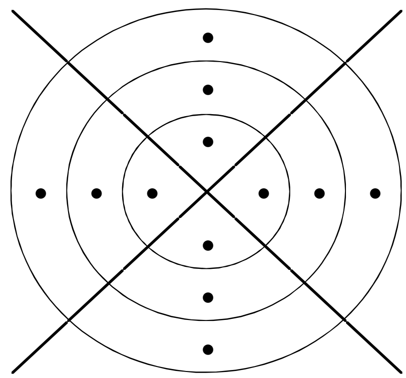
Stack diameter:	**19.5**	***inches***
Upstream diameter (A):	**33.0**	***inches***
Downstream diameter (B):	**146.0**	***inches***
Port length:	**6.00**	***inches***
Number of ports being used:	**2**	***see note***
Equivalent upstream diameter (A):	**1.692**	***Pass***
Equivalent downstream diameter (B):	**7.487**	***Pass***
All points at least 0.5" from stack wall:	**0.624**	***Pass***
Total points:	**16**	
Points per port:	**8**	



Typical vertical exhaust stack

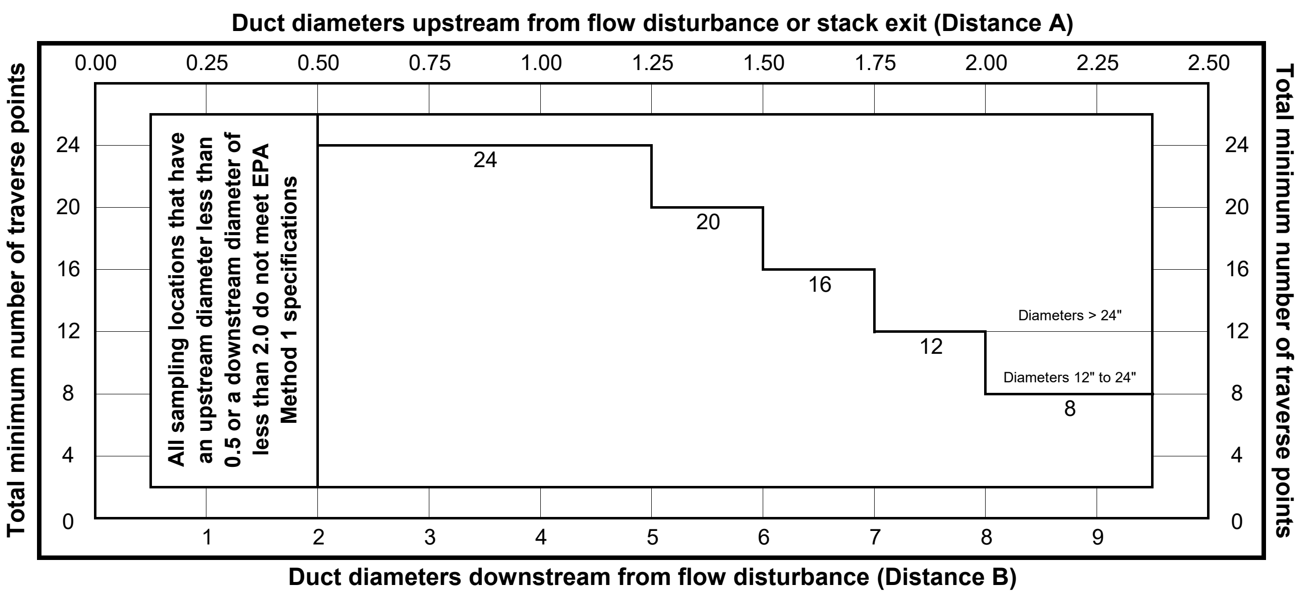
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	3.2	0.6	6.6
2	10.5	2.0	8.0
3	19.4	3.8	9.8
4	32.3	6.3	12.3
5	67.7	13.2	19.2
6	80.6	15.7	21.7
7	89.5	17.5	23.5
8	96.8	18.9	24.9
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

DUCT AREA = 2.074 ft^2



Example: Location of 12 points

Note: No traverse point shall be within 0.5" of the stack walls (see EPA 1 section 11.3.1). Points automatically adjusted to meet this criterion.



MONTROSE AIR QUALITY SERVICES

EPA METHOD 1 FIELD DATA

Project Information			
Client / Facility	Eculube	Date	1/26/22
Source / Location	RTO #1 Out	Data taken by	JH PB

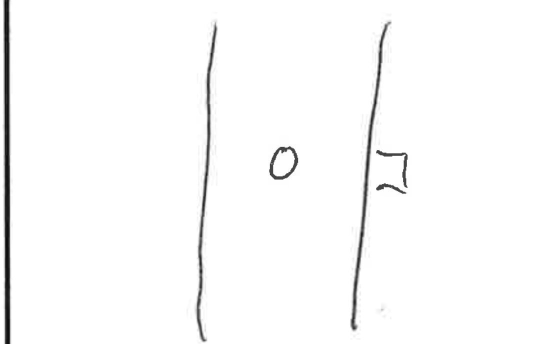
Circular/Elliptical Duct Measurements

	Port 1	Port 2	Port 3	Port 4
Far wall to outside of port distance, in.:	25.5	25.5		
Port length, in. (confirm flush with inside wall):	6.0	6.0		
Duct inner diameter, in.:	19.5	19.5		
Port diameter, in.:	3	3		
Upstream distance (A), in.:	33			
Downstream distance (B), in.:	146			
Number of ports (must be 90° to each other):	2			

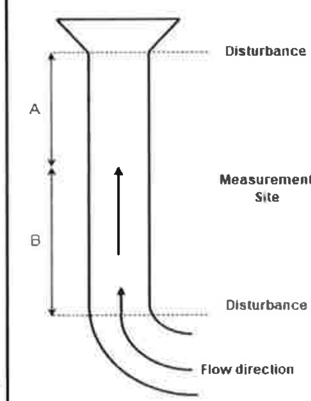
Duct Parameters			
Material (steel, fiberglass, PVC)	steel	Cyclonic flow expected?	No
Type of port (flange, npt nipple, etc.)	Nipple	Pitot ID	2-7
Orientation (vertical, horizontal, if diagonal specify angle)	Vert	Manometer ID	M1333
Elevation of ports above ground, ft.	~20	Angle finder / protractor ID	740

Traverse point	Outside port distance, in.	Null angle, α
1	6 5/8	2
2	8	2
3	9 3/4	0
4	12 1/4	1
5	19 1/4	3
6	21 3/4	4
7	23 1/2	5
8	24 7/8	4
1		1
2		0
3		6
4		7
5		4
6		2
7		1
8		0
Average of absolute α		

Diagram of duct and sampling location

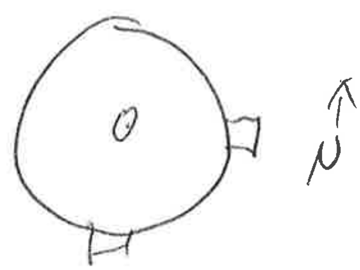


Example:

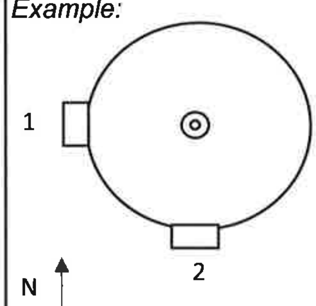


Cross-section sketch showing port locations and numbering

Label the following: port number 1, 2, etc.
north direction or other landmark
flow direction - ⊗ into page ⊙ out of page



Example:



*For stacks having diameters greater than 24 in., no traverse points shall be within 1.00 in. of the stack walls; and for stack diameters equal to or less than 24 in., no traverse points shall be located within 0.50 in. - EPA Method 1 section 11.3.1 & 11.3.2

**If schematics are unavailable, internal width can be estimated by measuring the portion of the port length not visible on the outside of the duct, which would be an estimate of the insulation thickness. Double this distance and subtract it from the outside width.

Appendix A.2
PCDD, PCDF, PCB & PAH Data Sheets

MONTROSE AIR QUALITY SERVICES

EPA Method 23 Field Datasheet (Isokinetic)

Project Information		Sampling Conditions			
Date	1/26/22	Static Pressure, in. H_2O	-.23	Ambient Temp, °F	42
Project #	RV0J-011833	Barometric Pressure, in. Hg	30.25	Ref. Barometer ID	NOAA
Customer/Facility	Eco Lube	Wind Speed / Direction	5/W	Precipitation, Y / N, type	N —
Unit ID/Sample Location	Outlet	Probe / Filter Temp Range, °F	248±25		
Run #	1	Operator	BB		

Sampling Equipment IDs		Calibration	
Meterbox ID	MB33	Meterbox Y	~~1.0236~~ 1.0059
Umbilical ID	PDX-100-2	Meterbox ΔH@, in. H_2O	1.6347
Nozzle ID	3167-1	Nozzle diameter, Dn, in.	.3167
Pitot / Probe ID	2-7	Pitot coefficient, Cp	.84
Manometer ID	MB33	Manometer zero and level	☑ yes
Sensitivity	.01	K-Factor	5.18, 4.9

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 5	~~☐ @~~	☑ @ 4.5
Pitot (-), pass @ in. H_2O	☑ @ 6	~~☐ @~~	☑ @ 6
Pitot visual inspection	☑ pass	~~☐ pass~~	☑ pass
Nozzle visual inspection	☑ pass	~~☐ pass~~	☑ pass
Meter, cfm @ in. Hg	.001 @ 11	~~@~~	.001 @ 9
Intermediate leak check volume, ft^3	/		/

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack		See	
Probe			
Filter Box			
Filter Exit		Final	
Meter outlet			
Impinger Exit		Run	
Other			
Ref. Thermometer ID			
Continuity Check	☐ Continuity w/ Proper Polarity		
Notes:			

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft^3	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH		Stack Temp, °F	Probe Temp, °F	Filter Temp, °F		Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F		XAD	Pump Vacuum, in. Hg
					Target	Actual			Box	Exit		Inlet	Outlet		
1	0	1410	522.178	.31	1.61	1.6	409	251	247	261	48		66	56	4.5
2	15		533.09	.31	1.61	1.6	454	251	223	251	49		65	53	5
3	30		543.76	.34	1.76	1.8	421	244	226	231	52		66	53	6
4	45		555.32	.31	1.61	1.6	462	255	231	258	53		66	51	5.5
5	60		566.47	.33	1.70	1.7	398	257	232	256	52		66	48	5.5
6	75		577.79	.33	1.70	1.7	392	243	226	240	51		65	50	5.5
7	90		588.98	.27	1.32	1.3	384	251	230	225	53		65	57	5
8	105	1610	599.06	.28	1.37	1.4	400	257	236	259	54		64	63	5
1	120	~~1610~~ 1627	604.465	.36	1.76	1.5	386	249	232	251	52		62	44	6.5
2	135		621.35	.36	1.76	1.8	395	250	234	236	50		62	44	6.5
3	150		633.17	.39	1.91	1.9	383	247	230	236	52		63	46	6.5
4	165		645.73	.36	1.76	1.8	387	254	241	268	50		62	47	6.5
5	180		657.04	.29	1.42	1.4	394	256	228	236	49		61	45	6
6	195		667.70	.24	1.17	1.2	412	255	225	234	46		59	44	5
7	210		677.34	.24	1.17	1.2	415	248	227	239	45		57	42	5
8	225		687.00	.33	1.70	1.7	378	243	233	251	45		57	43	5.5
Final	240	1927	698.143												[illegible]
Averages															

QA/QC Check: Completeness Y Legibility Y Accuracy Y Specifications Y Checked By JB Team Leader JLA

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MONTROSE AIR QUALITY SERVICES

E24 Method 2 3 Field Datasheet (Isokinetic)

Project Information

Date 1/27/22 Project # Proj-011833
Customer/Facility Eco lube
Unit ID/Sample Location outlet
Run # 2 Operator 803

Sampling Conditions

Static Pressure, in. H_2O -.19 Ambient Temp, °F 33
Barometric Pressure, in. Hg 30.37 Ref. Barometer ID NOAA
Wind Speed / Direction E/5 Precipitation, Y/N, type —
Probe / Filter Temp Range, °F 248±25

ALT 011 TC ID: See Ryan/Ruu

	Ambient °F	Ref. °F
Stack		
Probe		
Filter Box		
Filter Exit		
Meter outlet		
Impinger Exit		
Other		

Ref. Thermometer ID
Continuity Check ☐ Continuity w/ Proper Polarity
Notes:

Sampling Equipment IDs

Meterbox ID MB33
Umbilical ID PDX-10-2
Nozzle ID 3167-1
Pitot / Probe ID 2-7
Manometer ID MB33
Sensitivity .01

Calibration

Meterbox Y 1.0059 ~~1.0236~~
Meterbox ΔH@, in. H_2O 1.6347
Nozzle diameter, Dn, in. .3167
Pitot coefficient, Cp .84
Manometer zero and level ☑ yes
K-Factor 5.25

Equipment Checks

	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 4.5	☐ @ —	☑ @ 4
Pitot (-), pass @ in. H_2O	☑ @ 5	☐ @ —	☐ @ 4
Pitot visual inspection	☑ pass	☐ pass	☑ pass
Nozzle visual inspection	☑ pass	☐ pass	☑ pass
Meter, cfm @ in. Hg	.001 @ 11	.001 @ 10	.000 @ 10

Intermediate leak check volume, ft^3 782.690 / 782.835

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft^3	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH Target	Orifice Pressure Differential, ΔH Actual	Stack Temp, °F	Probe Temp, °F	Filter Temp, °F Box	Filter Temp, °F Exit	Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F Inlet	Dry Gas Meter Temperature, °F Outlet	XAD	Pump Vacuum, in. Hg
1	0	0927	668.815	.34	1.76	1.8	401	245	224	260	41		44	53	5
2	15		710.13	.32	1.66	1.7	395	248	225	232	43		51	49	6.5
3	30		721.51	.32	1.66	1.7	389	236	223	239	47		54	52	6.5
4	45		732.78	.30	1.56	1.6	424	237	228	247	50		56	54	6.5
5	60		743.84	.25	1.30	1.3	426	251	231	247	52		56	53	6
6	75		753.92	.24	1.25	1.3	381	248	226	233	53		56	51	6
7	90		763.97	.24	1.25	1.3	392	254	223	234	54		56	51	6
8	105	1127	774.03	.20	1.04	1.0	391	252	224	228	55		57	52	6
1	120	1139	782.690	.30	1.56	1.6	425	268	227	238	52		60	51	6
2	135		793.68	.24	1.25	1.3	414	250	225	236	51		62	51	6
3	150		803.84	.23	1.15	1.2	415	253	234	250	53		64	51	6
4	165		813.48	.25	1.25	1.3	441	242	238	251	53		64	51	6
5	180		823.43	.26	1.30	1.3	418	252	236	245	54		63	52	6
6	195		833.34	.28	1.40	1.4	425	235	233	248	56		64	55	6
7	210		846.10	.24	1.25	1.3	362	249	230	243	58		62	58	6
8	225		853.45	.26	1.30	1.3	375	250	232	251	62		62	60	6
Final	240	1339	863.294												
Averages															

QA/QC Check: Completeness X Legibility X Accuracy X Specifications ✓ Checked By JM Team Leader JK

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MONTROSE AIR QUALITY SERVICES

EPA Method 23 Field Datasheet (Isokinetic)

Project Information

Date 1/27/21 Project # proj-01833
Customer/Facility EcoLube
Unit ID/Sample Location Outlet
Run # 3 Operator RB

Sampling Conditions

Static Pressure, in. H_2O -.20 Ambient Temp, °F 47
Barometric Pressure, in. Hg 30.37 Ref. Barometer ID NOAA
Wind Speed / Direction 13/E Precipitation, Y / N, type —
Probe / Filter Temp Range, °F 248±25

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack	2-7	62	62
Probe	2-7	62	62
Filter Box	PDX-05-2	62	63
Filter Exit	FEI	62	63
Meter outlet	MB33	62	62
Impinger Exit	1-27	62	62
Other			

Ref. Thermometer ID 200456903
Continuity Check ✓ Continuity w/ Proper Polarity
Notes:

Sampling Equipment IDs

Meterbox ID MB33
Umbilical ID PDX-100-2
Nozzle ID 3167-1
Pitot / Probe ID 2-7
Manometer ID MB33
Sensitivity .01

Calibration

Meterbox Y ~~1.0236~~ 1.0059
Meterbox ΔH@, in. H_2O 1.6347
Nozzle diameter, Dn, in. .3167
Pitot coefficient, Cp .84
Manometer zero and level ✓ yes
K-Factor 5

Equipment Checks

	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	✓ @ 6	@ —	✓ @ 5
Pitot (-), pass @ in. H_2O	✓ @ 4	@ —	✓ @ 6
Pitot visual inspection	✓ pass	~~pass~~	✓ pass
Nozzle visual inspection	✓ pass	~~pass~~	✓ pass
Meter, cfm @ in. Hg	.001 @ 10	— @ —	0.001 @ 13

Intermediate leak check volume, ft³ 1011.637 / 1012.606

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft³	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH Target	Orifice Pressure Differential, ΔH Actual	Stack Temp, °F	Probe Temp, °F	Filter Temp, °F Box	Filter Temp, °F Exit	Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F Inlet	Dry Gas Meter Temperature, °F Outlet	XAD	Pump Vacuum, in. Hg
1	0	1441	868.050	.75	1.25	1.3	373	257	235	228	52		58	50	4.5
2	15		878.86	.27	1.35	1.4	383	242	230	231	52		58	46	5.5
3	30		888.45	.26	1.30	1.3	403	260	238	255	52		58	48	5.5
4	45		898.34	.29	1.45	1.5	385	261	240	257	49		58	48	6
5	60		908.94	.30	1.5	1.5	388	238	236	249	49		58	51	6
6	75		919.50	.25	1.25	1.3	332	256	235	256	48		58	55	6
7	90		929.54	.23	1.15	1.2	416	241	228	250	48		57	58	6
8	105		943.02	.24	1.20	1.2	411	249	236	251	46		62	56	6
1	120	1641 / 1651	949.462	.33	1.65	1.7	344	250	231	268	47		54	45	7
2	135		960.70	.35	1.75	1.8	383	245	228	231	45		54	45	7
3	150		973.56	.36	1.80	1.8	435	242	232	255	44		54	47	7
4	165		983.57	.35	1.75	1.8	398	249	229	252	44		53	47	7
5	180		995.01	.30	1.5	1.5	340	253	230	246	44		53	45	7
6	195		1004.04	.31	1.55	1.6	410	251	228	252	45		53	44	10
7	210	1821 / 1835	1011.54	.25	1.25	1.3	364	252	223	240	40		49	39	6
8	225		1022.93	.26	1.30	1.3	381	242	225	241	43		51	43	6
Final	240	1905	1032.473												
Averages															

QA/QC Check: Completeness Y Legibility Y Accuracy ✓ Specifications X Checked By JB Team Leader RB

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mid leak check 1 0.000 @ 26 mid leak 2 0.000 @ 26

MONTROSE AIR QUALITY SERVICES

Sample Recovery & Calibration Check Datasheet 23

Project Information		**Equipment Identification**	
Date	1/24-1/27/2022	Ref. Thermometer	—
Project #	006AS-011833	Hygrometer	—
Customer / Facility	Ecolube	Field Balance	17750271
Unit ID / Sample Location	RTO #1 Out	Check Weights	10639
Run #	1-3	Calipers	39744
Operator	JGt		

Balance Audit (Field balance must be within 0.5g of check weight mass)

Date	1/26	1/27	
Standard mass, g	500.00	500.0	
Field balance mass, g	499.9	499.9	

Ambient Conditions (Mobile Lab)

Relative humidity, % —

Temperature, °F —

Mobile lab # TU3

Moisture Determination

	Contents	Run1 Initial	Run1 Final	Run1 Net	Run 2 Initial	Run 2 Final	Run 2 Net	Run 3 Initial	Run 3 Final	Run 3 Net
Knockout		754.2	~~918.8~~ 916.5		665.9	866.5		755.7	928.3	
Impinger 1		871.0	876.6		813.8	815.0		870.6	877.5	
Impinger 2		851.1	853.4		834.7	835.4		823.6	819.7	
Impinger 3		729.5	730.4		734.8	736.2		732.9	730.6	
Impinger 4		1045.0	1077.5		976.0	1010.7		881.1	912.3	
Impinger 5										
Impinger 6										
Impinger 7										
Impinger 8										
Silica Gel										
Line Rinse										
Train Net Gain (Vlc)										

Nozzle Measurements (Difference between any two measurements must not be more than 0.004 in (0.1 mm))

	D1	D2	D3	Average
Nozzle 1 diameters	.3160	.3170	.3170	.3167
Nozzle 2 diameters	.2590	.2600	.2600	.2597
Nozzle 3 diameters				

.3167-1

.2597-1

Nozzle Material ☒ quartz ☐ glass ☐ steel ☐ titanium ☐ inconel ☐ other

Probe Type ☒ heated ☐ unheated ☐ air-cooled ☐ water-cooled ☐ other

Probe Liner ☒ quartz ☐ glass ☐ steel ☐ Teflon ☐ other

Filter Information

Front Half: ☒ quartz fiber ☐ glass fiber ☐ Teflon ☐ Teflon/quartz ☐ other

~~Filter~~ Trap Number: Run 1: 00E Run 2: 1221-831000 Run 3: 00F Run:

Back Half N/A quartz fiber ☐ glass fiber ☐ Teflon ☐ Teflon/quartz ☐ other

Reagent Information

Type	Lot Number
DI	KBP101
Acetone	21050003
Toluene	206856

Sample Observations

QA/QC Check: Completeness X Legibility X Accuracy X Specifications X

Checked by: JGt Team Leader: JGt

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MONTROSE AIR QUALITY SERVICES

EPA Method 4 Field Datasheet (Isokinetic)

Page 1 of 1

Project Information
Date 1/26/21 Project # 011833
Customer/Facility Ecolube
Unit ID/Sample Location RTO inlet
Run # 1 Operator JV

Sampling Conditions
Static Pressure, in. H_2O −1.8
Barometric Pressure, in. Hg 30.29
Wind Speed / Direction 5 W
Probe / Filter Temp Range, °F —
Ambient Temp, °F 50
Ref. Barometer ID NOAA
Precipitation, Y / N (N circled) type

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack		See X.	
Probe			
Filter Box			
Filter Exit		run	'hal
Meter outlet			
Impinger Exit			
Other			

Ref. Thermometer ID
Continuity Check ☐ Continuity w/ Proper Polarity
Notes:

Sampling Equipment IDs
Meterbox ID MB31
Umbilical ID PDX-10-1
Nozzle ID —
Pitot / Probe ID 002TP-3
Manometer ID MB31
Sensitivity 0.01

Calibration
Meterbox Y 0.9902
Meterbox ΔH@, in. H_2O 1.8162
Nozzle diameter, Dn, in. —
Pitot coefficient, Cp 0.84
Manometer zero and level ☑ yes
K-Factor —

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 5.5	☐ @	☑ @ 3.7
Pitot (-), pass @ in. H_2O	☑ @ 6.1	☐ @	☑ @ 6.1
Pitot visual inspection	☑ pass	☐ pass	☑ pass
Nozzle visual inspection	~~☐ pass~~	☐ pass	~~☐ pass~~
Meter, cfm @ in. Hg	0.001 @ 15	@	0.00 @ 12
Intermediate leak check volume, ft^3		/	/

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft^3	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH Target	Orifice Pressure Differential, ΔH Actual	Stack Temp, °F	Probe Temp, °F	Filter Temp, °F Box	Filter Temp, °F Exit	Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F Inlet	Dry Gas Meter Temperature, °F Outlet		Pump Vacuum, in. Hg
1	0	Q1410 JV	243.738		1.0	1.0					42		61		3
2	5		246.175			1.0					40		58		3
3	10		248.450			1.0					40		59		3
4	15		250.730			1.0					41		59		3
5	20		253.250			1.0					42		60		3
6	25		255.470			1.0					42		60		3
7	30		257.415			1.0					43		60		3
8	35		259.570			1.0					43		60		3
1	40		261.720			1.0					44		60		3
2	45		263.849			1.0					44		60		3
3	50		266.055			1.0					44		60		3
4	55		268.170			1.0					44		60		3
5	60	1510	270.225												
6															
7															
8															
Averages															

QA/QC Check: Completeness ____ Legibility ____ Accuracy ____ Specifications ____ Checked By ________ Team Leader ________

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MONTROSE AIR QUALITY SERVICES

EPA Method 4 Field Datasheet (Isokinetic)

Page 1 of 1

Project Information		Sampling Conditions		ALT 011	
Date	1/26/22	Static Pressure, in. H_2O	-1.8	TC ID:	Ambient °F / Ref. °F
Project #	011833	Ambient Temp, °F	45	Stack	See final run
Customer/Facility	Ecolube	Barometric Pressure, in. Hg	30.29	Probe	
Unit ID/Sample Location	RTO inlet	Ref. Barometer ID	NOAA	Filter Box	
Run #	2	Wind Speed / Direction	SW	Filter Exit	
Operator	JV	Precipitation, Y / N type	N	Meter outlet	
		Probe / Filter Temp Range, °F	–	Impinger Exit	
				Other	

Sampling Equipment IDs		Calibration	
Meterbox ID	~~0.9:~~ MB31	Meterbox Y	0.9902
Umbilical ID	PDX-19-3	Meterbox ΔH@, in. H_2O	1.8162
Nozzle ID	–	Nozzle diameter, Dn, in.	–
Pitot / Probe ID	002+P-3	Pitot coefficient, Cp	0.84
Manometer ID	MB31	Manometer zero and level	☑ yes
Sensitivity	0.01	K-Factor	–

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 6.3	☐ @	☑ @ 5.5
Pitot (-), pass @ in. H_2O	☑ @ 6.1	☐ @	☑ @ 5.9
Pitot visual inspection	☑ pass	☐ pass	☑ pass
Nozzle visual inspection	~~☐ pass~~	☐ pass	~~☐ pass~~
Meter, cfm @ in. Hg	0.000 @ 10	@	0.000 @ 9
Intermediate leak check volume, ft^3		/	/

Ref. Thermometer ID

Continuity Check ☐ Continuity w/ Proper Polarity

Notes:

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft^3	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH Target	ΔH Actual	Stack Temp, °F	Probe Temp, °F	Filter Temp, °F Box	Filter Temp, °F Exit	Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F Inlet	DGM Outlet		Pump Vacuum, in. Hg
1	0	1720	270.410	0.40	1.0	1.0	348				44		51		3
2	5		272.600	0.42		1.0	342				44		51		3
3	10		274.715	0.46		1.0	333				44		51		3
4	15		276.980	0.46		1.0	331				44		50		3
5	20		279.175	0.43		1.0	330				44		50		3
6	25		281.540	0.33		1.0	321				45		51		3
7	30		283.880	0.29		1.0	312				46		51		3
8	35		286.170	0.27		1.0	308				47		51		3
1	40		288.450	0.30		1.0	345				47		51		3
2	45		290.720	0.30		1.0	341				47		52		3
3	50		292.985	0.31		1.0	340				47		53		3
4	55		295.320	0.33		1.0	342				48		53		3
5	60	1920	297.515	0.34			331								
6				0.34			329								
7				0.29			327								
8				0.26			327								
Averages															

QA/QC Check: Completeness ✓ Legibility X Accuracy X Specifications X Checked By JM Team Leader JM

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MONTROSE AIR QUALITY SERVICES

EPA Method 4 Field Datasheet (Isokinetic)

Project Information

Date 1/27/22 Project # 011833

Customer/Facility Ecolube

Unit ID/Sample Location RTO Inlet

Run # 3 Operator JV

Sampling Conditions

Static Pressure, in. H_2O -1.5 Ambient Temp, °F 35

Barometric Pressure, in. Hg 30.37 Ref. Barometer ID NOAA

Wind Speed / Direction 16 E Precipitation, Y / (N) type

Probe / Filter Temp Range, °F —

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack		See final run	
Probe			
Filter Box			
Filter Exit			
Meter outlet			
Impinger Exit			
Other			

Ref. Thermometer ID

Continuity Check ☐ Continuity w/ Proper Polarity

Notes:

Sampling Equipment IDs

Meterbox ID MB31

Umbilical ID PDX-15-3

Nozzle ID —

Pitot / Probe ID 002TP-3

Manometer ID MB31

Sensitivity 0.01

Calibration

Meterbox Y 0.9962

Meterbox ΔH@, in. H_2O 1.8162

Nozzle diameter, Dn, in. —

Pitot coefficient, Cp 0.84

Manometer zero and level ☑ yes

K-Factor —

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 7.1	☐ @	☑ @ 5.9
Pitot (-), pass @ in. H_2O	☑ @ 6.5	☐ @	☑ @ 5.3
Pitot visual inspection	☑ pass	☐ pass	☑ pass
Nozzle visual inspection	~~☐ pass~~	☐ pass	~~☐ pass~~
Meter, cfm @ in. Hg	0.000 @ 10	@	0.000 @ 7
Intermediate leak check volume, ft^3		/	/

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft^3	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH Target	Orifice Pressure Differential, ΔH Actual	Stack Temp, °F	Probe Temp, °F	Filter Temp, °F Box	Filter Temp, °F Exit	Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F Inlet	Dry Gas Meter Temperature, °F Outlet		Pump Vacuum, in. Hg
1	0	927	297.722	.41	1.0	1.0	376				37		43		3
2	5		300.115	.40		1.0	380				38		44		3
3	10		302.345	.42		1.0	381				38		45		3
4	15		304.600	.43		1.0	375				39		47		3
5	20		307.010	.37		1.0	362				40		48		3
6	25		309.150	.34		1.0	353				42		49		3
7	30		311.360	.30		1.0	325				43		50		3
8	35		313.675	.24		1.0	303				44		51		3
1	40		315.975	.38		1.0	341				46		52		3
2	45		318.260	.36		1.0	334				47		53		3
3	50		320.565	.34		1.0	334				47		53		3
4	55		322.860	.33		1.0	339				48		53		3
5	60	1027	325.220	.37			348								
6				.35			353								
7				.29			329								
8				.22			318								
Averages															

QA/QC Check: Completeness X Legibility V Accuracy C Specifications X Checked By JK Team Leader JK

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MONTROSE AIR QUALITY SERVICES

EPA Method 4 Field Datasheet (Isokinetic)

Page 1 of 1

Project Information			
Date	1/27/22	Project #	011833
Customer/Facility	Ecolube		
Unit ID/Sample Location	RTO inlet		
Run #	4	Operator	JV

Sampling Conditions			
Static Pressure, in. H_2O	~~30.37~~ -2.2	Ambient Temp, °F	40
Barometric Pressure, in. Hg	30.37	Ref. Barometer ID	NOAA
Wind Speed / Direction	16 E	Precipitation, Y / (N) type	
Probe / Filter Temp Range, °F			

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack	002TP-3	67	61
Probe	002TP-3	67	61
Filter Box	—	—	—
Filter Exit	—	—	—
Meter outlet	MB31	67	62
Impinger Exit	I-51	67	62
Other			

Ref. Thermometer ID 200456908

Continuity Check ☑ Continuity w/ Proper Polarity

Notes:

Sampling Equipment IDs	
Meterbox ID	MB31
Umbilical ID	PDX-15-3
Nozzle ID	—
Pitot / Probe ID	002TP-3
Manometer ID	MB31
Sensitivity	0.01

Calibration	
Meterbox Y	0.9962
Meterbox ΔH@, in. H_2O	1.8162
Nozzle diameter, Dn, in.	—
Pitot coefficient, Cp	0.84
Manometer zero and level	☑ yes
K-Factor	—

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 6.3	☐ @	☑ @ 6.1
Pitot (-), pass @ in. H_2O	☑ @ 5.7	☐ @	☑ @ 6.0
Pitot visual inspection	☑ pass	☐ pass	☑ pass
Nozzle visual inspection	~~☐ pass~~	☐ pass	~~☐ pass~~
Meter, cfm @ in. Hg	0.000 @ 9	@	0.000 @ 10
Intermediate leak check volume, ft^3		/	/

Traverse Point #	Elapsed Time	Clock Time 24hr	DGM Reading, Vm, ft^3	Velocity Head, ΔP in H_2O	Orifice Pressure Differential, ΔH Target	Orifice Pressure Differential, ΔH Actual	Stack Temp, °F	Probe Temp, °F	Filter Temp, °F Box	Filter Temp, °F Exit	Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F Inlet	Dry Gas Meter Temperature, °F Outlet		Pump Vacuum, in. Hg
1	0	1441	327.355	.41	1.0	1.0	330				50		54		3
2	5		329.770	.40		1.0	333				50		54		3
3	10		332.165	.42		1.0	335				51		54		3
4	15		334.555	.44		1.0	333				52		54		3
5	20		337.010	.41		1.0	320				53		54		3
6	25		339.385	.30		1.0	255				53		55		3
7	30		341.795	.31		1.0	242				54		55		3
8	35		344.105	.29		1.0	221				54		55		3
1	40		346.650	.26		1.0	230				55		55		3
2	45		349.075	.27		1.0	228				55		56		3
3	50		351.485	.28		1.0	230				54		55		3
4	55		353.915	.28		1.0	239				54		56		3
5	60	1541	356.314	.37			257								
6				.36			269								
7				.29			265								
8				.24			208								
Averages															

QA/QC Check: Completeness X Legibility X Accuracy Y Specifications Y Checked By JV Team Leader JV

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MONTROSE AIR QUALITY SERVICES

Sample Recovery & Calibration Check Datasheet 4

Project Information		**Equipment Identification**	
Date	12/13/21	Ref. Thermometer	—
Project #	~~[illegible]~~ proj-011833	Hygrometer	—
Customer / Facility	Eco Lube	Field Balance	17750271
Unit ID / Sample Location	RTO EF1	Check Weights	10638
Run #	1-3	Calipers	—
Operator	JLH		

Balance Audit (Field balance must be within 0.5g of check weight mass)

Date	1/26/22	1/27/22	
Standard mass, g	500.0	500.0	
Field balance mass, g	499.9	499.9	

Ambient Conditions (Mobile Lab)

Relative humidity, %	—
Temperature, °F	—
Mobile lab #	—

Moisture Determination

	Contents	Run1 Initial	Run1 Final	Run1 Net	Run 2 Initial	Run 2 Final	Run 2 Net	Run 3 Initial	Run 3 Final	Run 3 Net (R4)	
Knockout					755.2					~~717.5~~	
Impinger 1	H_2O	709.1	717.5		~~[illegible]~~.9	757.9		746.8	759.4	717.5	729.6
Impinger 2	H_2O	843.9	843.8		833.1	832.4		791.8	791.3	843.8	843.6
Impinger 3	MT	704.0	703.9		751.8	751.0		713.2	711.0	703.9	703.7
Impinger 4											
Impinger 5											
Impinger 6											
Impinger 7											
Impinger 8											
Silica Gel	SG	1011.7	1016.6		994.8	1000.7		1000.6	1006.9	1016.6	1023.0
Line Rinse											
Train Net Gain (Vlc)											

Nozzle Measurements (Difference between any two measurements must not be more than 0.004 in (0.1 mm))

Nozzle 1 diameters ____ D1 ____ D2 ____ D3 ____ Average

Nozzle 2 diameters ____ D1 ____ D2 ____ D3 ____ Average

Nozzle 3 diameters ____ D1 ____ D2 ____ D3 ____ Average

NA

Nozzle Material ☐ quartz ☐ glass ☐ steel ☐ titanium ☐ inconel ☐ other ____

Probe Type ☐ heated ☐ unheated ☐ air-cooled ☐ water-cooled ☐ other ____

Probe Liner ☐ quartz ☐ glass ☐ steel ☐ Teflon ☐ other ____

Filter Information

NA

Front Half: ☐ quartz fiber ☐ glass fiber ☐ Teflon ☐ Teflon/quartz ☐ other ____

Filter Number: Run 1: ____ Run 2: ____ Run 3: ____ Run __: ____

Back Half: ☐ quartz fiber ☐ glass fiber ☐ Teflon ☐ Teflon/quartz ☐ other ____

Reagent Information

Type	Lot Number
NA	

Sample Observations

QA/QC Check: Completeness X Legibility X Accuracy X Specifications X

Checked by: JLH Team Leader: JLH

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Appendix A.3
Visible Emissions Data Sheets

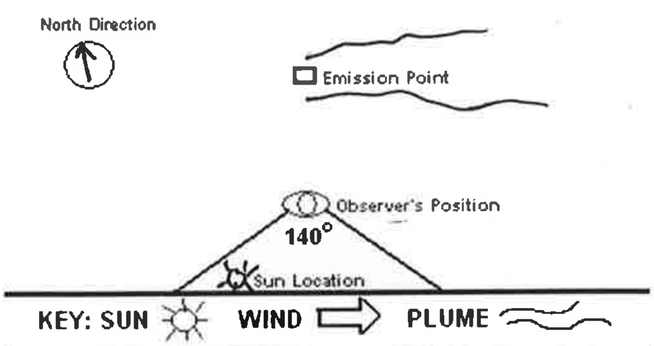
MONTROSE AIR QUALITY SERVICES

VISIBLE EMISSION OBSERVATIONS

Project Information

Client / Facility	Ecolube
Source / Location	RTO outlet
Project No.	011833
Operation Mode/Output Rate	at/near capacity
Control Equipment	RTO
Control Eq. Operation Mode	active

Plume Information	Start	End
Emission Point Description	stack	same
Height Above Ground	35'	
Height Relative to Observer	30'	
Distance from Observer	200'	
Direction from Observer	N	
Plume Type: Continuous		
Intermittent		
Fugitive		
Plume Color	N/A	
Water Droplets Present?	NO	
Attached Plume		
Detached Plume		
Point in the plume at which the opacity was observed	0.5 stack widths	
Description of Background	sky	
Color of Background	blue	
Condition of Sky	clear	
Wind Speed (mph)	5	
Wind Direction (From)	W	
Ambient Temp (°F)	50	
Relative Humidity (%)	74%	



Comments:

Observation Record

Test Method: 9 | Date: 1/26/22

Start: 1523 | Stop: 1529

Min	0	15	30	45	Min	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Range of Opacity Readings: Maximum 0 % ; Minimum 0 %

Number of readings above % = 0

Average Opacity for 24 readings = 0 %

Observer's Name (print) Julian Vaca

Organization Montrose Air Quality Services, LLC

Certified By Smoke School INC

Certification Date 9/1/21 **Expiration Date** 3/1/22

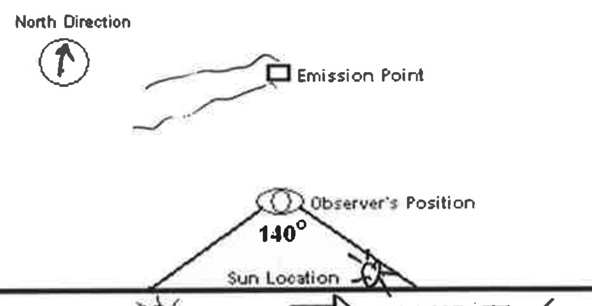
Observer's Signature Julian Vaca

MONTROSE AIR QUALITY SERVICES

VISIBLE EMISSION OBSERVATIONS

Project Information	
Client / Facility	Ecolube
Source / Location	RTO outlet
Project No.	011833
Operation Mode/Output Rate	at/near capacity
Control Equipment	RTO
Control Eq. Operation Mode	active

Plume Information	Start	End
Emission Point Description	stack	same
Height Above Ground	35'	
Height Relative to Observer	30'	
Distance from Observer	200'	
Direction from Observer	N	
Plume Type: Continuous		
Intermittent		
Fugitive		
Plume Color	N/A	
Water Droplets Present?	no	
Attached Plume		
Detached Plume		
Point in the plume at which the opacity was observed	0.5 stack widths	
Description of Background	sky	
Color of Background	blue	
Condition of Sky	clear	
Wind Speed (mph)	16	
Wind Direction (From)	E	
Ambient Temp (°F)	35	
Relative Humidity (%)	52%	



KEY: SUN WIND PLUME

Comments:

Observation Record

Test Method 9 Date 1/27/22

Start 1046 Stop 1052

Min	0	15	30	45	Min	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Range of Opacity Readings: Maximum 0 %; Minimum 0 %

Number of readings above % = 0

Average Opacity for 24 readings = 0 %

Observer's Name (print) Julian Vaca

Organization
Montrose Air Quality Services, LLC

Certified By smoke school inc

Certification Date 9/1/21 **Expiration Date** 3/1/22

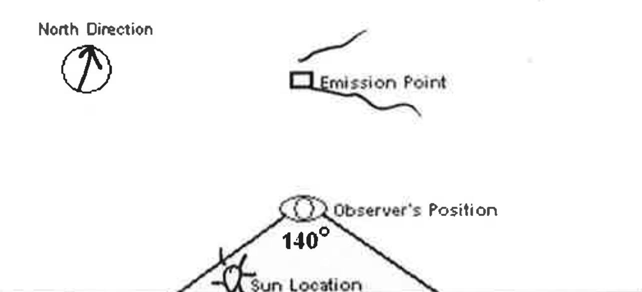
Observer's Signature Julian Vaca

MONTROSE AIR QUALITY SERVICES

VISIBLE EMISSION OBSERVATIONS

Project Information	
Client / Facility	Ecolube
Source / Location	RTO Outlet
Project No.	011833
Operation Mode/Output Rate	at/near capacity
Control Equipment	RTO
Control Eq. Operation Mode	active

Plume Information	Start	End
Emission Point Description	stack	same
Height Above Ground	35'	
Height Relative to Observer	30'	
Distance from Observer	200'	
Direction from Observer	N	
Plume Type: Continuous		
Intermittent		
Fugitive		
Plume Color	N/A	
Water Droplets Present?	No	
Attached Plume		
Detached Plume		
Point in the plume at which the opacity was observed	0.5 stack widths	
Description of Background	sky	
Color of Background	blue	
Condition of Sky	clear	
Wind Speed (mph)	0	
Wind Direction (From)	N/A	
Ambient Temp (°F)	45	
Relative Humidity (%)	48%	



KEY: SUN WIND PLUME

Comments:

Observation Record

Test Method 9 Date 1/27/22

Start 1545 Stop 1551

Min	0	15	30	45	Min	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Range of Opacity Readings: Maximum 0 %, Minimum 0 %

Number of readings above % = 0

Average Opacity for 24 readings = 0 %

Observer's Name (print): Julian Vaca

Organization: Montrose Air Quality Services, LLC

Certified By: Smoke School inc

Certification Date: 9/1/21 Expiration Date: 3/1/22

Observer's Signature: Julian Vaca

Appendix A.4
Instrumental Test Method Data

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Run 1 Average Results

14:10:01 - 15:10:01

	Name:	O2-742	CO2-742	THC In 292	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	JUM 3-300A	JUM 3-300A				
Jan 26 2022	14:11:01	13.95	5.453	237.9	15.96				
Jan 26 2022	14:12:01	13.68	5.582	205.7	28.61				
Jan 26 2022	14:13:01	14.08	5.392	219.1	23.67				
Jan 26 2022	14:14:01	14.06	5.396	221.4	24.00				
Jan 26 2022	14:15:01	13.81	5.467	201.6	29.72				
Jan 26 2022	14:16:01	16.62	3.487	341.8	14.59				
Jan 26 2022	14:17:01	19.32	1.438	219.9	15.35				
Jan 26 2022	14:18:00	16.23	3.661	261.3	32.10				
Jan 26 2022	14:19:01	12.41	6.509	216.6	26.04				
Jan 26 2022	14:20:01	13.73	5.611	208.9	25.90				
Jan 26 2022	14:21:01	12.97	6.065	170.7	31.36				
Jan 26 2022	14:22:01	13.89	5.529	165.9	17.42				
Jan 26 2022	14:23:01	13.81	5.565	171.6	18.81				
Jan 26 2022	14:24:01	13.59	5.655	140.0	33.04				
Jan 26 2022	14:25:01	13.97	5.479	147.8	26.89				
Jan 26 2022	14:26:01	13.87	5.533	156.3	27.22				
Jan 26 2022	14:27:01	14.78	4.791	258.9	31.81				
Jan 26 2022	14:28:01	19.17	1.555	254.7	16.42				
Jan 26 2022	14:29:01	18.40	2.177	198.9	18.95				
Jan 26 2022	14:30:01	12.06	6.732	181.3	34.64				
End of port 1 point 1									
Jan 26 2022	14:31:00	13.46	5.812	130.9	28.49				
Jan 26 2022	14:32:01	13.88	5.528	136.2	28.81				
Jan 26 2022	14:33:01	13.75	5.572	94.67	32.94				
Jan 26 2022	14:34:01	15.73	4.166	312.5	17.58				
Jan 26 2022	14:35:01	19.20	1.546	229.6	18.35				
Jan 26 2022	14:36:01	16.96	3.128	217.4	36.02				
Jan 26 2022	14:37:01	12.35	6.580	185.7	30.05				
Jan 26 2022	14:38:01	13.47	5.797	151.4	29.62				
Jan 26 2022	14:39:01	13.19	5.937	114.3	34.62				
Jan 26 2022	14:40:01	13.64	5.681	110.1	20.29				
Jan 26 2022	14:41:01	13.73	5.645	110.2	21.71				
Jan 26 2022	14:42:01	13.53	5.708	78.80	36.28				
Jan 26 2022	14:43:01	13.84	5.559	75.63	30.48				
Jan 26 2022	14:44:01	13.73	5.608	91.28	30.66				
Jan 26 2022	14:45:01	13.74	5.607	114.1	35.10				
Jan 26 2022	14:46:01	17.49	2.823	310.4	18.86				
Jan 26 2022	14:47:01	19.21	1.516	145.7	20.52				
Jan 26 2022	14:48:01	14.75	4.782	248.4	37.35				
Jan 26 2022	14:49:01	12.46	6.490	137.5	31.23				
Jan 26 2022	14:50:01	13.08	6.048	205.6	31.37				
End of port 1 point 2									
Jan 26 2022	14:51:01	13.05	6.048	83.69	35.87				
Jan 26 2022	14:52:01	13.73	5.627	103.4	21.41				
Jan 26 2022	14:53:01	13.74	5.630	97.55	22.64				
Jan 26 2022	14:54:01	13.60	5.665	34.76	36.69				
Jan 26 2022	14:55:01	13.87	5.541	39.03	30.23				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Jan 26 2022	14:56:01	13.85	5.546	47.11	30.30				
Jan 26 2022	14:57:01	14.88	4.760	180.1	34.44				
Jan 26 2022	14:58:01	19.17	1.544	185.3	18.81				
Jan 26 2022	14:59:01	18.33	2.224	129.4	21.61				
Jan 26 2022	15:00:01	12.21	6.620	116.1	37.13				
Jan 26 2022	15:01:01	12.90	6.179	96.10	31.12				
Jan 26 2022	15:02:01	12.83	6.207	80.53	31.38				
Jan 26 2022	15:03:01	13.57	5.707	8.814	35.84				
Jan 26 2022	15:04:01	13.94	5.464	36.81	20.18				
Jan 26 2022	15:05:00	13.91	5.502	35.92	21.86				
Jan 26 2022	15:06:01	13.72	5.566	9.173	36.87				
Jan 26 2022	15:07:01	14.01	5.443	19.01	30.92				
Jan 26 2022	15:08:01	13.98	5.443	29.57	31.30				
Jan 26 2022	15:09:01	13.94	5.443	7.356	35.96				
Jan 26 2022	15:10:01	13.92	5.489	30.77	20.70				
End of port 1 point 3									

	Average:	14.48	5.038	145.9	27.47				
	Max:	19.32	6.732	341.8	37.35				
	Min:	12.06	1.438	7.356	14.59				

Stratification Results

Port	**Point**	O2-742	CO2-742	THC In 292	THC Out 297				
1	1	14.69	4.892	206.9	21.86				
1	2	14.52	5.007	167.4	26.01				
1	3	14.16	5.278	67.74	25.92				
	Strat diff:	0.233	0.219	59.55	1.413				
	Strat %:	2.052	4.329	54.03	5.746				

MoleDAQ Stripchart file

For Outlet EPA 23 Run 1 mol. weight
1/26/2022

Time	O2	CO2	THC In	THC Out
15:11:01	13.93	5.49	240.5	21.44
15:12:01	18.44	2.07	258.2	35.06
15:13:01	19.29	1.46	61.3	30.82
15:14:01	13.83	5.51	24.2	33.37
15:15:01	12.67	6.32	12.2	39.78
15:16:01	13.08	6.05	17.3	22.16
15:17:01	13.20	5.97	19.2	23.22
15:18:01	13.92	5.46	267.1	38.73
15:19:01	14.22	5.31	338.3	30.50
15:20:01	14.19	5.31	182.6	46.66
15:21:01	18.66	2.04	13.35	34.54
15:22:01	20.56	0.18	11.06	1.15
15:23:01	9.17	0.77	10.20	7.55
15:24:01	15.47	3.42	9.54	35.95
15:25:01	19.29	1.41	9.07	29.14
15:26:01	17.23	2.97	8.63	32.30
15:27:01	13.95	5.38	8.26	38.12
15:28:01	13.94	5.40	7.88	19.48
15:29:01	13.96	5.43	7.64	20.64
15:30:01	13.79	5.51	7.40	37.06
15:31:01	14.03	5.37	7.14	31.54
15:32:01	14.01	5.39	6.88	31.93
15:33:01	13.86	5.44	6.58	36.97
15:34:01	13.93	5.45	6.42	18.01
15:35:01	13.78	5.55	6.27	20.77
15:36:01	13.68	5.61	6.16	39.40
15:37:01	13.96	5.44	6.02	35.09
15:38:01	14.04	5.38	5.79	35.23
15:39:01	15.80	4.03	5.66	38.76
15:40:01	19.17	1.51	5.56	17.68
15:41:01	17.50	2.79	5.41	20.50
15:42:01	13.83	5.48	5.23	37.96
15:43:01	14.05	5.37	5.15	32.90
15:44:01	13.97	5.42	5.07	33.00
15:45:01	13.82	5.52	4.97	38.01
15:46:01	13.75	5.57	4.86	18.94
15:47:01	13.94	5.47	4.88	20.42
15:48:01	13.81	5.50	2.08	37.20
15:49:01	14.26	5.24	0.87	31.53
15:50:01	15.24	4.52	0.79	30.40
15:51:01	19.19	1.47	0.76	35.73
15:52:01	19.15	1.52	0.69	17.07

MoleDAQ Stripchart file

For Outlet EPA 23 Run 1 mol. weight
1/26/2022

Time	O2	CO2	THC In	THC Out
15:53:01	19.40	1.34	0.67	17.12
15:54:01	14.58	4.97	0.67	34.35
15:55:01	14.50	5.06	0.61	28.70
15:56:01	14.49	5.08	14.15	11.45
15:57:01	14.22	5.19	0.59	-1.11
15:58:01	17.34	2.88	0.71	-1.11
15:59:01	19.49	1.27	0.58	-1.11
16:00:01	18.85	1.69	0.63	-1.11
16:01:01	14.71	4.88	0.60	-1.12
16:02:01	14.62	4.97	0.54	-1.11
16:03:01	14.29	5.12	0.81	-1.12
16:04:01	14.51	5.04	0.56	-1.12
16:05:01	14.43	5.09	0.79	-1.13
16:06:01	14.13	5.25	0.86	-1.13
16:07:01	14.55	5.00	0.65	-1.13
16:08:01	14.52	5.05	0.62	-1.13
16:09:01	14.15	5.21	0.60	-1.13
16:10:01	14.46	5.09	34.12	-1.13
16:11:01	14.45	5.11	198.6	2.93
16:12:01	14.12	5.26	205.4	29.82
16:13:01	20.05	0.88	195.3	1.97
16:14:01	20.93	0.20	194.7	2.10
16:15:01	20.93	0.20	194.8	2.35
16:16:01	20.92	0.21	194.8	2.66
16:17:01	20.92	0.21	194.9	2.73
16:18:01	20.93	0.20	194.7	2.15
16:19:01	20.94	0.20	194.6	1.74
16:20:01	20.95	0.19	194.6	1.41
16:21:01	20.75	0.33	195.7	6.40
16:22:01	14.53	5.07	201.6	16.52
16:23:01	14.29	5.22	202.1	18.13
16:24:01	13.96	5.37	206.2	33.75
16:25:01	14.43	5.12	204.1	27.58
16:26:01	14.57	5.01	204.0	27.64
16:27:01	17.49	2.73	204.6	33.57
16:28:01	19.63	1.19	198.4	15.67
16:29:01	16.33	3.69	200.7	17.02
16:30:01	14.03	5.32	206.2	33.06
16:31:01	14.41	5.14	204.0	27.22
16:32:01	14.39	5.13	204.0	27.25
16:33:01	14.27	5.16	206.8	34.40
16:34:01	15.61	4.24	200.9	15.66

MoleDAQ Stripchart file

For Outlet EPA 23 Run 1 mol. weight
1/26/2022

Time	O2	CO2	THC In	THC Out
16:35:01	19.56	1.23	198.6	16.35
16:36:01	18.45	1.99	203.8	35.05
16:37:01	14.64	4.95	203.7	26.24
16:38:01	14.49	5.07	203.8	26.41
16:39:01	14.13	5.24	206.7	34.18
16:40:01	14.57	5.03	201.6	16.37
16:41:01	14.52	5.03	201.9	17.49
16:42:01	18.19	2.19	203.2	31.51
16:43:01	19.70	1.12	200.6	25.80
16:44:01	15.61	4.22	203.2	27.04
16:45:01	14.15	5.21	205.2	30.63
16:46:01	14.43	5.12	198.6	16.46
16:47:01	14.38	5.14	125.8	17.44
16:48:01	14.26	5.16	7.41	41.34
16:49:01	14.70	4.92	11.54	26.73
16:50:01	14.62	4.97	9.76	26.96
16:51:01	14.28	5.13	7.79	49.93
16:52:01	14.53	5.05	8.65	15.84
16:53:01	14.50	5.04	15.23	16.81
16:54:01	14.23	5.18	16.01	40.78
16:55:01	14.71	4.93	15.07	26.52
16:56:01	14.65	4.96	14.82	26.70
16:57:01	14.24	5.18	14.45	48.96
16:58:01	14.52	5.07	25.87	15.27
16:59:01	14.52	5.08	1.58	16.20
17:00:01	14.88	4.71	116.3	38.14
17:01:01	19.69	1.17	879.1	23.42
17:02:01	19.08	1.59	766.8	25.47
17:03:01	14.31	5.14	434.6	46.32
17:04:01	14.53	5.08	349.2	14.54
17:05:01	14.36	5.18	91.7	14.95
17:06:01	14.08	5.31	27.1	36.30
17:07:01	14.53	5.06	368.4	23.99
17:08:01	14.24	5.27	390.3	24.04
17:09:01	13.93	5.40	391.6	44.00
17:10:01	14.28	5.26	403.2	13.50
17:11:01	14.10	5.34	409.7	13.75
17:12:01	13.88	5.46	403.6	34.71
17:13:01	14.26	5.25	392.9	23.01
17:14:01	14.20	5.28	391.0	22.69
17:15:01	13.95	5.40	382.2	41.27
17:16:01	14.39	5.17	377.3	12.49

MoleDAQ Stripchart file

For Outlet EPA 23 Run 1 mol. weight
1/26/2022

Time	O2	CO2	THC In	THC Out
17:17:01	14.32	5.18	371.0	12.58
17:18:01	14.11	5.29	354.9	30.80
17:19:01	14.59	5.01	339.4	19.67
Average	**14.42**	**5.09**	**163.0**	**28.24**

For Outlet EPA 23 Run 1 mol. weight

18:22:01	14.44	5.06	124.7	5.50
18:23:01	14.48	5.05	125.2	5.95
18:24:01	14.15	5.20	125.1	12.05
18:25:01	14.62	4.94	122.1	8.21
18:26:01	14.67	4.90	122.1	8.49
18:27:01	14.46	5.01	121.9	14.54
Average	**14.47**	**5.03**	**123.5**	**9.12**

Gray-shaded values excluded from average

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Run 2 Average Results

17:20:01 - 18:20:01

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
Jan 26 2022	17:21:01	14.22	5.190	322.8	36.47				
Jan 26 2022	17:22:01	14.64	4.982	312.9	10.50				
Jan 26 2022	17:23:01	14.36	5.139	303.9	10.85				
Jan 26 2022	17:24:01	14.13	5.273	307.8	24.27				
Jan 26 2022	17:25:01	14.60	4.994	296.6	17.34				
Jan 26 2022	17:26:01	14.43	5.105	286.2	16.97				
Jan 26 2022	17:27:01	14.13	5.225	279.5	31.60				
Jan 26 2022	17:28:01	14.49	5.065	273.0	9.407				
Jan 26 2022	17:29:01	14.38	5.125	267.1	9.607				
Jan 26 2022	17:30:01	14.19	5.217	258.7	21.10				
Jan 26 2022	17:31:01	14.65	4.945	259.2	15.06				
Jan 26 2022	17:32:01	14.52	5.031	255.4	14.99				
Jan 26 2022	17:33:01	14.22	5.195	249.1	28.99				
Jan 26 2022	17:34:01	14.66	4.953	243.1	8.599				
Jan 26 2022	17:35:01	14.47	5.071	236.9	8.888				
Jan 26 2022	17:36:01	14.15	5.217	234.2	18.97				
Jan 26 2022	17:37:01	14.67	4.927	226.9	13.52				
Jan 26 2022	17:38:01	14.55	4.986	225.0	13.62				
Jan 26 2022	17:39:01	14.38	5.089	216.5	25.32				
Jan 26 2022	17:40:01	14.73	4.892	211.6	7.513				
End of port 1 point 1									
Jan 26 2022	17:41:01	14.50	5.021	206.4	7.829				
Jan 26 2022	17:42:01	14.29	5.118	203.5	17.37				
Jan 26 2022	17:43:01	14.83	4.830	198.0	11.78				
Jan 26 2022	17:44:01	14.54	4.981	193.9	12.15				
Jan 26 2022	17:45:01	14.39	5.053	190.4	22.53				
Jan 26 2022	17:46:01	14.72	4.895	187.3	7.005				
Jan 26 2022	17:47:01	14.49	5.032	184.7	7.418				
Jan 26 2022	17:48:01	14.24	5.114	179.6	14.88				
Jan 26 2022	17:49:01	14.53	4.974	176.3	10.88				
Jan 26 2022	17:50:01	14.73	4.882	222.0	10.99				
Jan 26 2022	17:51:00	14.27	5.117	177.2	20.09				
Jan 26 2022	17:52:00	14.74	4.864	163.5	6.496				
Jan 26 2022	17:53:00	14.64	4.902	160.6	6.847				
Jan 26 2022	17:54:01	14.35	5.065	156.2	14.41				
Jan 26 2022	17:55:01	14.82	4.787	153.9	10.04				
Jan 26 2022	17:56:01	14.76	4.857	153.6	10.25				
Jan 26 2022	17:57:01	14.41	5.010	153.2	18.32				
Jan 26 2022	17:58:01	14.84	4.800	149.9	6.039				
Jan 26 2022	17:59:01	14.66	4.878	148.5	6.308				
Jan 26 2022	18:00:01	14.35	5.046	146.2	13.06				
End of port 1 point 2									
Jan 26 2022	18:01:01	14.78	4.812	142.1	9.075				
Jan 26 2022	18:02:01	14.72	4.861	139.0	9.444				
Jan 26 2022	18:03:01	14.43	5.003	138.4	16.73				
Jan 26 2022	18:04:01	14.70	4.879	139.9	5.806				
Jan 26 2022	18:05:01	14.67	4.897	139.3	6.222				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Jan 26 2022	18:06:01	18.61	1.871	124.5	12.07				
Jan 26 2022	18:07:01	20.05	0.787	124.3	9.267				
Jan 26 2022	18:08:01	15.80	4.042	152.3	9.586				
Jan 26 2022	18:09:01	14.28	5.112	136.0	16.04				
Jan 26 2022	18:10:01	14.48	5.019	134.1	5.701				
Jan 26 2022	18:11:00	14.48	5.019	134.1	6.009				
Jan 26 2022	18:12:01	14.18	5.200	133.2	11.52				
Jan 26 2022	18:13:01	14.54	5.002	129.5	8.473				
Jan 26 2022	18:14:01	14.54	4.996	129.7	8.669				
Jan 26 2022	18:15:01	14.29	5.117	129.6	15.64				
Jan 26 2022	18:16:01	14.68	4.929	128.9	5.498				
Jan 26 2022	18:17:01	14.40	5.078	128.6	6.056				
Jan 26 2022	18:18:01	14.20	5.195	127.0	11.85				
Jan 26 2022	18:19:01	14.71	4.891	124.5	8.194				
Jan 26 2022	18:20:01	14.45	5.042	123.8	8.722				
End of port 1 point 3									

	Average:	14.68	4.877	190.5	12.81				
	Max:	20.05	5.273	322.8	36.47				
	Min:	14.13	0.787	123.8	5.498				

Stratification Results

Port	**Point**	O2-742	CO2-742	THC In 665	THC Out 297				
1	1	14.44	5.065	260.2	12.34				
1	2	14.53	4.965	171.9	9.207				
1	3	15.01	4.604	132.2	7.880				
	Strat diff:	0.350	0.187	72.10	2.531				
	Strat %:	2.387	5.617	8.612	6.137				

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Run 2 Post run bias

17:20:01 - 18:20:01

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				
Run summary data									
	Raw Avg:	14.68	4.877	190.5	12.81				
	Max:	20.05	5.273	322.8	36.47				
	Min:	14.13	0.787	123.8	5.498				
Cylinder Concentrations									
	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				
Calibration Readings									
	Zero reading:	0.018	0.166	0.670	0.043				
	Low reading:			301.9	28.58				
	Mid reading:	10.11	10.20	494.7	48.27				
	High reading:	23.04	22.48	853.1	84.37				
EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	0.078	0.738	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.525	N/A	N/A				
High %Err:	**<2.0**	0.000	-0.044	N/A	N/A				
EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	0.670	0.043				
Low %Err:	**5% of cyl**	N/A	N/A	-2.400	-0.990				
Mid %Err:	**5% of cyl**	N/A	N/A	-0.900	-1.360				
High %Err:	**N/A**	N/A	N/A	-0.200	-0.380				
Initial Bias Data									
	Zero reading:	0.335	0.137	0.590	0.043				
	Span reading:	22.99	10.09	491.2	48.27				
Zero % bias:	**<5.0**	1.376	-0.129	N/A	N/A				
Span % bias:	**<5.0**	-0.217	-0.489	N/A	N/A				
Final Bias Data									
	Zero reading:	0.389	0.246	5.740	0.520				
	Span reading:	23.02	10.04	503.7	50.51				
Zero % bias:	**<5.0**	1.610	0.356	N/A	N/A				
Span % bias:	**<5.0**	-0.087	-0.711	N/A	N/A				
Zero % drift:	**<3.0**	0.234	0.485	N/A	N/A				
Span % drift:	**<3.0**	0.130	0.222	N/A	N/A				
Zero drift:	**<3.0% span**	N/A	N/A	-5.070	-0.477				
Span drift:	**<3.0% span**	N/A	N/A	-9.000	-2.240				
Bias Corrected Averages									
	Cor Avg:	14.57	4.678	190.5	12.81				

CEM System Bias and Linearity
Correction Calculations
Ecolube Recovery

Run 2 for Inlet Method 4				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
	CALIBRATION SPAN GASES			
High Calibration Span:	23.04	22.49	Date: 1/26/2022	
Mid Calibration Span:	10.05	9.857	Time: 1720-1820	
Low Calibration Span:	0.000	0.000	Unit: RTO Inlet	
Mid Span % of Range:	43.6	43.8		
	SYSTEM CALIBRATION ERROR TEST			
High As Found Value:	23.04	22.48		
Mid As Found Value:	10.11	10.20		
Low As Found Value:	0.018	0.166		
High Calibration Error:	0.000	-0.044	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.525	**< 2.0%**	**PASS**
Low Calibration Error:	0.078	0.738	**< 2.0%**	**PASS**
	SYSTEM BIAS CHECK AND DRIFT ASSESSMENT			
	Pre-Test Bias			
Zero Value:	0.335	0.137		
Span Value:	22.99	10.09		
	Post-Test Bias			
Zero Value:	0.389	0.246		
Span Value:	23.02	10.04		
System Initial Bias, %:	1.376	-0.129	**< 5.0%**	**PASS**
System Initial Span, %:	-0.217	-0.489	**< 5.0%**	**PASS**
System Final Bias, %:	1.610	0.356	**< 5.0%**	**PASS**
System Final Span, %:	-0.087	-0.711	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.234	0.485	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.130	0.222	**< 3.0%**	**PASS**
	RAW TEST AVERAGES			
Raw Concentrations:	18.76	1.96		
% of High Calibration Span:	81.4	8.7		
Corrected Averages	**18.72**	**1.77**		

Note: Raw (not drift corrected) Tedlar bag concentrations used in calculations.

CEM System Bias and Linearity Correction Calculations Ecolube Recovery

Run 1 for Outlet Method 23				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
CALIBRATION SPAN GASES				
High Calibration Span:	23.04	22.49	Date: 1/26/2022	
Mid Calibration Span:	10.05	9.857	Time: 1410-1827	
Low Calibration Span:	0.000	0.000	Unit: RTO Outlet	
Mid Span % of Range:	43.6	43.8		
SYSTEM CALIBRATION ERROR TEST				
High As Found Value:	23.04	22.48		
Mid As Found Value:	10.11	10.20		
Low As Found Value:	0.018	0.166		
High Calibration Error:	0.000	-0.044	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.525	**< 2.0%**	**PASS**
Low Calibration Error:	0.078	0.738	**< 2.0%**	**PASS**
SYSTEM BIAS CHECK AND DRIFT ASSESSMENT				
	Pre-Test Bias			
Zero Value:	0.335	0.137		
Span Value:	22.99	10.09		
	Post-Test Bias			
Zero Value:	0.389	0.246		
Span Value:	23.02	10.04		
System Initial Bias, %:	1.376	-0.129	**< 5.0%**	**PASS**
System Initial Span, %:	-0.217	-0.489	**< 5.0%**	**PASS**
System Final Bias, %:	1.610	0.356	**< 5.0%**	**PASS**
System Final Span, %:	-0.087	-0.711	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.234	0.485	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.130	0.222	**< 3.0%**	**PASS**
RAW TEST AVERAGES				
Raw Concentrations:	14.52	5.01		
% of High Calibration Span:	63.0	22.3		
Corrected Averages	**14.40**	**4.81**		

Note: Test data should not exceed high calibration span; however, analyzer range can be set higher.

MAQDAQ 1.0

Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

~~Run 1~~ Average Results Run 3

09:27:00 - 10:27:00

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				

	Average:	13.53	5.787	320.7	20.71				
	Max:	14.76	6.389	512.5	45.74				
	Min:	12.70	4.911	145.3	6.503				

Stratification Results

Port	**Point**	O2-742	CO2-742	THC In 665	THC Out 297				
	Strat diff:	0.580	0.359	142.5	5.447				
	Strat %:	4.293	7.446	44.25	35.43				

Data not printed on this page but recovered from strip chart and available on following pages.

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Run 1 Post run bias

09:27:00 - 10:27:00

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				

Run summary data

	Raw Avg:	13.53	5.787	320.7	20.71				
	Max:	14.76	6.389	512.5	45.74				
	Min:	12.70	4.911	145.3	6.503				

Cylinder Concentrations

	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				

Calibration Readings

	Zero reading:	0.013	0.097	0.340	0.270				
	Low reading:			297.7	29.79				
	Mid reading:	10.11	10.23	491.2	49.90				
	High reading:	23.10	22.55	852.3	84.66				

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.056	0.431	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.659	N/A	N/A				
High %Err:	**<2.0**	0.260	0.267	N/A	N/A				

EPA Method 25A Error Calculations

Zero %Err:	**N/A**	N/A	N/A	0.340	0.270				
Low %Err:	**5% of cyl**	N/A	N/A	-6.600	0.220				
Mid %Err:	**5% of cyl**	N/A	N/A	-4.400	0.270				
High %Err:	**N/A**	N/A	N/A	-1.000	-0.090				

Initial Bias Data

	Zero reading:	0.472	0.130	0.340	0.270				
	Span reading:	23.00	10.23	491.2	49.90				
Zero % bias:	**<5.0**	1.992	0.147	N/A	N/A				
Span % bias:	**<5.0**	-0.434	0.000	N/A	N/A				

Final Bias Data

	Zero reading:	0.433	0.215	11.96	-0.030				
	Span reading:	22.98	9.998	481.2	48.95				
Zero % bias:	**<5.0**	1.823	0.525	N/A	N/A				
Span % bias:	**<5.0**	-0.521	-1.032	N/A	N/A				
Zero % drift:	**<3.0**	0.169	0.378	N/A	N/A				
Span % drift:	**<3.0**	0.087	1.032	N/A	N/A				
Zero drift:	**<3.0% span**	N/A	N/A	-11.620	0.300				
Span drift:	**<3.0% span**	N/A	N/A	10.000	0.950				

Bias Corrected Averages

	Cor Avg:	13.37	5.567	320.7	20.71				

MoleDAQ Stripchart file

For EPA 25A Run 2
1/27/2022

Time	O2	CO2	THC In	THC Out
09:28:00	14.67	4.96	145.2	6.54
09:29:00	14.63	5.00	148.6	6.74
09:30:00	14.32	5.16	150.9	14.90
09:31:00	14.73	4.92	151.5	10.72
09:32:00	14.67	4.98	155.3	10.85
09:33:00	14.32	5.16	157.0	19.01
09:34:00	14.49	5.08	160.8	7.02
09:35:00	14.54	5.07	163.8	7.24
09:36:00	14.11	5.30	165.9	16.36
09:37:00	14.06	5.39	164.9	12.17
09:38:00	13.89	5.54	168.5	12.40
09:39:00	13.47	5.75	174.3	21.45
09:40:00	13.66	5.66	189.9	8.07
09:41:00	13.68	5.68	189.4	8.51
09:42:00	13.30	5.86	199.0	18.69
09:43:00	14.02	5.44	203.9	13.38
09:44:00	14.26	5.30	208.4	13.50
09:45:00	13.76	5.58	216.8	24.02
09:46:00	14.00	5.47	224.2	8.63
09:47:00	13.85	5.59	230.8	9.14
09:48:00	13.21	5.94	239.5	21.08
09:49:00	13.69	5.70	246.7	15.29
09:50:00	13.69	5.69	258.6	15.57
09:51:00	13.46	5.77	253.0	27.72
09:52:00	13.76	5.64	269.2	9.62
09:53:00	13.73	5.68	276.0	10.17
09:54:00	13.37	5.84	289.5	24.10
09:55:00	13.92	5.53	293.9	17.06
09:56:00	13.93	5.56	294.1	17.41
09:57:00	13.10	6.03	299.9	32.19
09:58:00	13.34	5.95	319.1	11.06
09:59:00	13.29	5.98	331.3	11.84
10:00:00	12.90	6.17	341.5	28.60
10:01:00	13.34	5.94	349.7	20.24
10:02:00	13.37	5.95	360.6	20.90
10:03:00	13.25	5.95	372.8	38.08
10:04:00	13.54	5.82	376.2	11.72
10:05:00	13.46	5.87	378.5	12.40
10:06:00	13.10	6.06	385.1	31.84
10:07:00	13.21	6.03	396.3	22.98
10:08:00	13.14	6.11	403.4	23.68
10:09:00	12.88	6.21	397.9	43.31

MoleDAQ Stripchart file

For EPA 25A Run 2
1/27/2022

Time	O2	CO2	THC In	THC Out
10:10:00	13.06	6.15	424.4	13.42
10:11:00	12.95	6.21	443.1	14.44
10:12:00	12.82	6.27	454.2	36.41
10:13:00	13.41	5.90	450.1	25.09
10:14:00	13.43	5.92	457.3	26.15
10:15:00	13.26	5.97	469.9	48.12
10:16:00	13.33	5.97	461.0	13.99
10:17:00	13.06	6.14	474.7	15.18
10:18:00	12.84	6.28	470.5	37.28
10:19:00	13.11	6.09	465.0	26.42
10:20:00	13.06	6.16	475.1	27.56
10:21:00	12.82	6.28	485.8	50.72
10:22:00	12.84	6.31	493.6	14.82
10:23:00	12.78	6.35	500.8	16.03
10:24:00	12.69	6.39	495.6	40.63
10:25:00	12.93	6.21	490.8	27.87
10:26:00	13.02	6.18	501.2	28.59
10:27:00	13.12	6.08	512.6	52.50
Average	**13.53**	**5.79**	**320.5**	**20.52**

For Outlet EPA 23 Run 2 mol. weight

09:28:00	14.67	4.96	145.20	6.54
09:29:00	14.63	5.00	148.58	6.74
09:30:00	14.32	5.16	150.90	14.90
09:31:00	14.73	4.92	151.55	10.72
09:32:00	14.67	4.98	155.27	10.85
09:33:00	14.32	5.16	156.98	19.01
09:34:00	14.49	5.08	160.77	7.02
09:35:00	14.54	5.07	163.78	7.24
09:36:00	14.11	5.30	165.89	16.36
09:37:00	14.06	5.39	164.87	12.17
09:38:00	13.89	5.54	168.50	12.40
09:39:00	13.47	5.75	174.31	21.45
09:40:00	13.66	5.66	189.87	8.07
09:41:00	13.68	5.68	189.39	8.51
09:42:00	13.30	5.86	199.05	18.69
09:43:00	14.02	5.44	203.94	13.38
09:44:00	14.26	5.30	208.35	13.50
09:45:00	13.76	5.58	216.84	24.02
09:46:00	14.00	5.47	224.20	8.63
09:47:00	13.85	5.59	230.77	9.14
09:48:00	13.21	5.94	239.50	21.08

MoleDAQ Stripchart file

For Outlet EPA 23 Run 2 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
09:49:00	13.69	5.70	246.65	15.29
09:50:00	13.69	5.69	258.57	15.57
09:51:00	13.46	5.77	253.01	27.72
09:52:00	13.76	5.64	269.16	9.62
09:53:00	13.73	5.68	275.95	10.17
09:54:00	13.37	5.84	289.46	24.10
09:55:00	13.92	5.53	293.89	17.06
09:56:00	13.93	5.56	294.13	17.41
09:57:00	13.10	6.03	299.90	32.19
09:58:00	13.34	5.95	319.07	11.06
09:59:00	13.29	5.98	331.28	11.84
10:00:00	12.90	6.17	341.52	28.60
10:01:00	13.34	5.94	349.72	20.24
10:02:00	13.37	5.95	360.61	20.90
10:03:00	13.25	5.95	372.79	38.08
10:04:00	13.54	5.82	376.25	11.72
10:05:00	13.46	5.87	378.48	12.40
10:06:00	13.10	6.06	385.08	31.84
10:07:00	13.21	6.03	396.30	22.98
10:08:00	13.14	6.11	403.41	23.68
10:09:00	12.88	6.21	397.95	43.31
10:10:00	13.06	6.15	424.44	13.42
10:11:00	12.95	6.21	443.09	14.44
10:12:00	12.82	6.27	454.24	36.41
10:13:00	13.41	5.90	450.09	25.09
10:14:00	13.43	5.92	457.34	26.15
10:15:00	13.26	5.97	469.91	48.12
10:16:00	13.33	5.97	461.04	13.99
10:17:00	13.06	6.14	474.66	15.18
10:18:00	12.84	6.28	470.52	37.28
10:19:00	13.11	6.09	464.98	26.42
10:20:00	13.06	6.16	475.07	27.56
10:21:00	12.82	6.28	485.80	50.72
10:22:00	12.84	6.31	493.55	14.82
10:23:00	12.78	6.35	500.78	16.03
10:24:00	12.69	6.39	495.61	40.63
10:25:00	12.93	6.21	490.81	27.87
10:26:00	13.02	6.18	501.21	28.59
10:27:00	13.12	6.08	512.64	52.50
10:28:00	13.19	6.06	516.47	14.78
10:29:00	13.14	6.08	523.35	15.95
10:30:00	13.08	6.12	517.72	41.78

MoleDAQ Stripchart file

For Outlet EPA 23 Run 2 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
10:31:00	13.21	6.02	513.75	29.02
10:32:00	13.32	5.99	517.35	29.86
10:33:00	13.24	6.01	520.73	55.02
10:34:00	13.03	6.17	519.32	12.08
10:35:00	10.84	9.31	536.64	0.51
10:36:00	11.19	10.68	543.00	6.44
10:37:00	21.30	19.63	553.22	3.70
10:38:00	22.68	19.87	541.81	23.91
10:39:00	21.08	0.78	605.86	37.12
10:40:00	3.87	0.27	589.33	0.27
10:41:00	2.80	1.41	511.94	9.77
10:42:00	12.92	6.12	39.21	45.15
10:43:00	13.13	6.08	23.09	31.76
10:44:00	12.81	6.33	17.43	32.36
10:45:00	12.73	6.37	14.45	58.19
10:46:00	12.75	6.38	45.46	16.62
10:47:00	12.58	6.50	476.55	18.38
10:48:00	12.61	6.47	527.91	48.45
10:49:00	12.73	6.38	572.10	33.93
10:50:00	12.76	6.36	236.57	34.24
10:51:00	12.73	6.37	37.27	62.74
10:52:00	12.78	6.35	28.25	17.54
10:53:00	12.66	6.44	24.68	19.25
10:54:00	12.66	6.43	22.85	50.20
10:55:00	12.81	6.31	21.27	35.07
10:56:00	12.76	6.35	20.35	35.49
10:57:00	12.77	6.34	18.30	64.24
10:58:00	12.76	6.36	16.35	18.30
10:59:00	12.65	6.45	14.32	19.82
11:00:00	12.67	6.41	13.09	51.18
11:01:00	12.89	6.25	11.84	36.19
11:02:00	12.89	6.25	11.23	36.87
11:03:00	12.90	6.24	10.32	67.74
11:04:00	12.87	6.27	9.74	19.97
11:05:00	12.79	6.35	9.35	21.67
11:06:00	12.76	6.33	9.20	53.11
11:07:00	12.95	6.20	8.83	37.96
11:08:00	12.82	6.27	8.62	38.98
11:09:00	12.86	6.23	8.48	71.17
11:10:00	12.81	6.28	8.22	20.72
11:11:00	12.70	6.37	7.94	22.66
11:12:00	12.71	6.36	7.76	58.46

MoleDAQ Stripchart file

For Outlet EPA 23 Run 2 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
11:13:00	12.89	6.21	7.72	40.24
11:14:00	12.79	6.30	7.51	41.48
11:15:00	12.74	6.30	7.48	75.89
11:16:00	12.78	6.32	7.27	21.51
11:17:00	12.62	6.44	7.46	23.32
11:18:00	12.63	6.41	6.90	60.86
11:19:00	12.86	6.26	6.85	42.11
11:20:00	12.69	6.37	6.75	43.62
11:21:00	12.74	6.34	6.76	80.36
11:22:00	12.69	6.38	7.02	23.11
11:23:00	12.60	6.46	6.72	25.17
11:24:00	12.61	6.42	6.59	64.24
11:25:00	12.85	6.27	6.35	44.42
11:26:00	12.94	6.23	6.19	45.61
11:27:00	13.19	6.09	6.16	83.20
11:28:00	13.57	5.85	6.20	23.93
11:29:00	13.59	5.85	6.15	26.04
11:30:00	17.17	3.15	6.00	4.67
11:31:00	20.99	0.22	6.03	1.75
11:32:00	21.01	0.21	6.10	1.65
11:33:00	21.01	0.19	5.96	1.64
11:34:00	21.01	0.19	5.73	1.60
11:35:00	21.02	0.19	5.58	1.90
11:36:00	19.26	1.58	5.64	51.17
11:37:00	13.02	6.14	5.52	44.30
11:38:00	12.88	6.23	5.40	45.45
11:39:00	12.95	6.18	5.32	78.44
11:40:00	12.91	6.20	5.16	22.76
11:41:00	12.87	6.25	5.30	24.50
11:42:00	12.89	6.21	5.37	58.91
11:43:00	13.15	6.06	5.07	41.67
11:44:00	12.99	6.14	4.97	42.86
11:45:00	13.03	6.13	4.89	76.54
11:46:00	12.56	6.48	4.79	22.68
11:47:00	12.36	6.63	4.82	24.53
11:48:00	12.39	6.59	4.80	57.95
11:49:00	12.59	6.44	4.84	40.16
11:50:00	12.52	6.50	4.80	40.88
11:51:00	12.55	6.46	4.84	71.75
11:52:00	12.58	6.47	4.87	22.11
11:53:00	12.42	6.57	5.03	24.05
11:54:00	12.48	6.52	4.90	55.66

MoleDAQ Stripchart file

For Outlet EPA 23 Run 2 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
11:55:00	12.67	6.38	4.96	38.84
11:56:00	12.67	6.39	4.77	38.32
11:57:00	12.65	6.37	4.82	65.97
11:58:00	12.71	6.36	4.67	21.33
11:59:00	12.59	6.43	4.73	22.50
12:00:00	12.79	6.28	4.72	49.87
12:01:00	12.98	6.14	4.82	34.58
12:02:00	12.95	6.17	4.65	34.38
12:03:00	12.99	6.12	4.64	57.80
12:04:00	13.02	6.12	4.71	19.04
12:05:00	12.89	6.19	4.49	19.96
12:06:00	12.97	6.14	4.49	42.96
12:07:00	13.17	6.02	4.40	30.06
12:08:00	13.07	6.08	4.46	29.56
12:09:00	13.18	6.01	4.46	49.37
12:10:00	13.11	6.05	4.48	16.73
12:11:00	13.12	6.04	4.45	17.31
12:12:00	13.19	5.99	4.53	37.59
12:13:00	13.30	5.93	4.53	26.70
12:14:00	13.28	5.96	4.40	26.57
12:15:00	13.24	5.95	4.46	44.32
12:16:00	13.30	5.94	4.33	15.41
12:17:00	13.16	6.01	4.24	16.20
12:18:00	13.21	5.99	4.28	34.37
12:19:00	13.32	5.90	4.32	24.74
12:20:00	13.35	5.90	4.19	24.32
12:21:00	13.23	5.94	4.24	39.91
12:22:00	13.27	5.94	4.26	14.03
12:23:00	13.24	5.96	4.24	14.70
12:24:00	13.02	6.07	4.19	30.94
12:25:00	13.40	5.85	4.10	22.25
12:26:00	13.38	5.87	4.14	22.24
12:27:00	13.19	5.95	4.05	36.91
12:28:00	13.34	5.89	4.06	13.11
12:29:00	13.30	5.93	4.06	13.54
12:30:00	12.88	6.13	4.10	28.44
12:31:00	13.42	5.84	3.95	20.42
12:32:00	13.39	5.84	3.93	21.69
12:33:00	13.19	5.94	4.05	35.01
12:34:00	13.44	5.82	3.91	12.21
12:35:00	13.37	5.87	3.78	12.57
12:36:00	13.04	6.02	3.79	25.95

MoleDAQ Stripchart file

For Outlet EPA 23 Run 2 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
12:37:00	13.55	5.74	3.79	18.89
12:38:00	13.56	5.75	3.79	18.62
12:39:00	13.30	5.84	3.77	30.31
12:40:00	13.58	5.72	3.82	10.97
12:41:00	13.38	5.85	3.71	11.31
12:42:00	13.04	6.01	3.78	23.35
12:43:00	13.61	5.69	3.73	17.28
12:44:00	13.59	5.73	3.60	17.36
12:45:00	13.23	5.89	3.68	27.94
12:46:00	13.54	5.75	3.71	10.38
12:47:00	13.37	5.84	3.73	10.67
12:48:00	13.07	5.99	3.73	21.59
12:49:00	13.53	5.73	3.73	16.00
12:50:00	13.57	5.72	3.68	15.85
12:51:00	13.26	5.87	3.73	25.49
12:52:00	13.58	5.72	3.60	9.72
12:53:00	13.39	5.82	3.68	10.02
12:54:00	13.08	5.98	3.64	20.12
12:55:00	13.56	5.70	3.55	14.97
12:56:00	13.67	5.65	3.64	14.95
12:57:00	13.34	5.80	3.52	23.97
12:58:00	13.68	5.65	3.37	9.36
12:59:00	13.51	5.74	3.33	9.69
13:00:00	13.22	5.87	3.44	19.09
13:01:00	13.74	5.59	3.55	14.25
13:02:00	13.75	5.59	3.55	14.35
13:03:00	13.92	5.41	3.48	23.08
13:04:00	14.38	5.13	3.38	8.36
13:05:00	14.31	5.18	3.44	8.54
13:06:00	13.98	5.35	3.45	18.23
13:07:00	14.24	5.21	3.37	13.75
13:08:00	14.33	5.19	3.38	13.72
13:09:00	13.82	5.47	3.34	22.43
13:10:00	14.01	5.41	3.17	8.22
13:11:00	13.85	5.51	3.17	8.36
13:12:00	13.56	5.65	3.16	18.13
13:13:00	13.91	5.45	3.15	13.75
13:14:00	13.85	5.52	3.11	13.95
13:15:00	13.28	5.84	2.97	22.81
13:16:00	13.72	5.62	2.95	8.28
13:17:00	13.89	5.47	2.98	8.37
13:18:00	13.72	5.54	2.94	18.28

MoleDAQ Stripchart file

For Outlet EPA 23 Run 2 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
13:19:00	14.24	5.26	3.03	13.81
13:20:00	14.07	5.36	2.86	13.74
13:21:00	13.76	5.52	3.00	22.36
13:22:00	13.95	5.44	2.92	8.06
13:23:00	13.75	5.58	3.03	8.20
13:24:00	13.36	5.76	2.99	17.56
13:25:00	14.01	5.36	2.99	12.96
13:26:00	14.28	5.21	3.08	12.91
13:27:00	13.97	5.38	3.04	20.74
13:28:00	14.09	5.31	3.00	7.55
13:29:00	14.08	5.35	3.01	7.65
13:30:00	13.69	5.54	3.00	16.69
13:31:00	14.15	5.33	3.03	12.54
13:32:00	13.85	5.50	3.09	12.53
13:33:00	13.62	5.62	2.96	20.62
13:34:00	13.85	5.50	2.96	7.45
13:35:00	13.82	5.53	3.02	7.44
13:36:00	13.72	5.52	3.12	16.20
13:37:00	14.12	5.30	3.07	12.31
13:38:00	14.13	5.32	2.99	12.40
13:39:00	13.57	5.65	3.02	20.07
Average	**13.29**	**5.93**	**108.1**	**26.55**

Gray-shaded values excluded from average

CEM System Bias and Linearity
Correction Calculations
Ecolube Recovery

Run 3 for Inlet Method 4				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
	CALIBRATION SPAN GASES			
High Calibration Span:	23.04	22.49	Date: 1/27/2022	
Mid Calibration Span:	10.05	9.857	Time: 0927-1027	
Low Calibration Span:	0.000	0.000	Unit: RTO Inlet	
Mid Span % of Range:	43.6	43.8		
	SYSTEM CALIBRATION ERROR TEST			
High As Found Value:	23.10	22.55		
Mid As Found Value:	10.11	10.23		
Low As Found Value:	0.013	0.097		
High Calibration Error:	0.260	0.267	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.659	**< 2.0%**	**PASS**
Low Calibration Error:	0.056	0.431	**< 2.0%**	**PASS**
	SYSTEM BIAS CHECK AND DRIFT ASSESSMENT			
	Pre-Test Bias			
Zero Value:	0.472	0.130		
Span Value:	23.00	10.23		
	Post-Test Bias			
Zero Value:	0.433	0.215		
Span Value:	22.980	9.998		
System Initial Bias, %:	1.992	0.147	**< 5.0%**	**PASS**
System Initial Span, %:	-0.434	0.000	**< 5.0%**	**PASS**
System Final Bias, %:	1.823	0.525	**< 5.0%**	**PASS**
System Final Span, %:	-0.521	-1.032	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.169	0.378	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.087	1.032	**< 3.0%**	**PASS**
	RAW TEST AVERAGES			
Raw Concentrations:	15.83	4.02		
% of High Calibration Span:	68.7	17.9		
Corrected Averages	**15.72**	**3.81**		

Note: Raw (not drift corrected) Tedlar bag concentrations used in calculations.

CEM System Bias and Linearity
Correction Calculations
Ecolube Recovery

Run 2 for Outlet Method 23				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
CALIBRATION SPAN GASES				
High Calibration Span:	23.04	22.49	Date: 1/27/2022	
Mid Calibration Span:	10.05	9.857	Time: 0927-1339	
Low Calibration Span:	0.000	0.000	Unit: RTO Outlet	
Mid Span % of Range:	43.6	43.8		
SYSTEM CALIBRATION ERROR TEST				
High As Found Value:	23.04	22.48		
Mid As Found Value:	10.11	10.20		
Low As Found Value:	0.018	0.166		
High Calibration Error:	0.000	-0.044	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.525	**< 2.0%**	**PASS**
Low Calibration Error:	0.078	0.738	**< 2.0%**	**PASS**
SYSTEM BIAS CHECK AND DRIFT ASSESSMENT				
Pre-Test Bias				
Zero Value:	0.472	0.130		
Span Value:	23.00	10.23		
Post-Test Bias				
Zero Value:	0.433	0.215		
Span Value:	22.98	9.998		
System Initial Bias, %:	1.970	-0.160	**< 5.0%**	**PASS**
System Initial Span, %:	-0.174	0.133	**< 5.0%**	**PASS**
System Final Bias, %:	1.801	0.218	**< 5.0%**	**PASS**
System Final Span, %:	-0.260	-0.898	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.169	0.378	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.087	1.032	**< 3.0%**	**PASS**
RAW TEST AVERAGES				
Raw Concentrations:	13.29	5.93		
% of High Calibration Span:	57.7	26.4		
Corrected Averages	**13.12**	**5.71**		

Note: Test data should not exceed high calibration span; however, analyzer range can be set higher.

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Run 2 Average Results									
14:41:00 - 15:41:00									
	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
Jan 27 2022	14:42:00	12.68	6.272	378.7	27.49				
Jan 27 2022	14:43:00	13.18	6.000	383.7	23.53				
Jan 27 2022	14:44:00	13.17	6.005	400.0	24.05				
Jan 27 2022	14:45:00	13.32	5.888	402.9	35.96				
Jan 27 2022	14:46:00	13.44	5.813	407.5	12.03				
Jan 27 2022	14:47:00	13.36	5.901	405.7	13.26				
Jan 27 2022	14:48:00	12.92	6.120	405.4	30.14				
Jan 27 2022	14:49:00	13.24	5.966	404.1	24.98				
Jan 27 2022	14:50:00	13.22	5.973	408.5	25.52				
Jan 27 2022	14:51:00	13.07	6.048	409.3	37.82				
Jan 27 2022	14:52:00	12.98	6.125	413.5	12.89				
Jan 27 2022	14:53:00	12.97	6.158	423.2	14.17				
Jan 27 2022	14:54:00	12.74	6.254	430.4	31.99				
Jan 27 2022	14:55:00	13.10	6.060	439.9	26.31				
Jan 27 2022	14:56:00	13.27	5.949	444.3	26.46				
Jan 27 2022	14:57:00	13.25	5.936	447.5	39.46				
Jan 27 2022	14:58:00	13.28	5.936	446.8	12.93				
Jan 27 2022	14:59:00	13.36	5.901	452.9	13.74				
Jan 27 2022	15:00:00	13.26	5.921	449.3	32.21				
Jan 27 2022	15:01:00	13.52	5.769	446.9	26.70				
End of port 1 point 1									
Jan 27 2022	15:02:00	13.52	5.793	442.4	27.24				
Jan 27 2022	15:03:00	13.35	5.875	443.1	40.21				
Jan 27 2022	15:04:00	13.31	5.923	431.2	12.80				
Jan 27 2022	15:05:00	13.05	6.089	427.1	13.98				
Jan 27 2022	15:06:00	12.83	6.215	450.5	33.73				
Jan 27 2022	15:07:00	13.20	5.972	461.0	27.68				
Jan 27 2022	15:08:00	13.41	5.863	461.7	28.01				
Jan 27 2022	15:09:00	13.36	5.864	462.5	41.28				
Jan 27 2022	15:10:00	13.36	5.897	465.6	13.46				
Jan 27 2022	15:11:00	13.30	5.926	469.3	14.34				
Jan 27 2022	15:12:00	13.20	5.963	471.9	34.76				
Jan 27 2022	15:13:00	13.36	5.855	475.7	28.28				
Jan 27 2022	15:14:00	13.48	5.830	466.6	28.72				
Jan 27 2022	15:15:00	13.43	5.829	471.6	42.61				
Jan 27 2022	15:16:00	13.34	5.893	467.9	13.80				
Jan 27 2022	15:17:00	13.16	6.028	468.1	14.87				
Jan 27 2022	15:18:00	12.99	6.093	468.9	35.55				
Jan 27 2022	15:19:00	13.20	5.980	475.1	28.94				
Jan 27 2022	15:20:00	13.25	5.952	471.5	29.46				
Jan 27 2022	15:21:00	13.24	5.951	482.5	43.78				
End of port 1 point 2									
Jan 27 2022	15:22:00	13.34	5.915	486.1	13.75				
Jan 27 2022	15:23:00	13.36	5.888	487.7	14.78				
Jan 27 2022	15:24:00	13.33	5.886	478.9	34.53				
Jan 27 2022	15:25:00	13.50	5.773	475.7	28.91				
Jan 27 2022	15:26:00	13.57	5.744	476.2	29.30				

MAQDAQ 1.0

Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Jan 27 2022	15:27:00	13.56	5.736	474.7	43.89				
Jan 27 2022	15:28:00	13.51	5.786	477.2	13.64				
Jan 27 2022	15:29:00	13.43	5.846	473.4	14.61				
Jan 27 2022	15:30:00	13.29	5.912	475.9	35.69				
Jan 27 2022	15:31:00	13.43	5.812	463.2	29.02				
Jan 27 2022	15:32:00	13.28	5.943	475.3	29.64				
Jan 27 2022	15:33:00	13.20	5.958	496.3	44.59				
Jan 27 2022	15:34:00	13.33	5.901	514.2	13.85				
Jan 27 2022	15:35:00	13.51	5.785	506.7	14.17				
Jan 27 2022	15:36:00	13.37	5.844	493.8	34.40				
Jan 27 2022	15:37:00	13.59	5.717	516.1	28.76				
Jan 27 2022	15:38:00	13.62	5.714	522.2	29.36				
Jan 27 2022	15:39:00	13.52	5.730	526.1	43.41				
Jan 27 2022	15:40:00	13.56	5.749	522.3	13.47				
Jan 27 2022	15:41:00	13.57	5.768	520.5	14.32				
End of port 1 point 3									

	Average:	13.29	5.920	458.3	26.15				
	Max:	13.62	6.272	526.1	44.59				
	Min:	12.68	5.714	378.7	12.03				

Stratification Results

Port	**Point**	O2-742	CO2-742	THC In 665	THC Out 297				
1	1	13.15	5.986	419.7	20.23				
1	2	13.23	5.942	459.7	21.58				
1	3	13.42	5.823	488.9	21.25				
	Strat diff:	0.153	0.069	32.80	0.560				
	Strat %:	1.156	1.589	7.981	3.758				

MoleDAQ Stripchart file

For Outlet EPA 23 Run 3 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
15:43:00	13.63	5.68	515.9	29.01
15:44:00	13.68	5.66	349.8	29.24
15:45:00	13.66	5.67	42.56	52.04
15:46:00	13.56	5.73	29.18	13.26
15:47:00	13.59	5.74	23.21	13.88
15:48:00	13.38	5.83	19.27	40.54
15:49:00	13.63	5.69	16.74	29.23
15:50:00	13.52	5.77	106.7	29.65
15:51:00	13.35	5.88	485.9	99.11
15:52:00	17.89	1.44	434.8	4.29
15:53:00	20.62	0.26	79.55	32.48
15:54:00	21.04	0.17	29.39	48.33
15:55:00	21.05	0.16	21.52	48.00
15:56:00	22.20	13.06	17.05	2.20
15:57:00	23.02	21.99	14.55	1.39
15:58:00	23.00	22.10	13.06	1.35
15:59:00	22.77	21.86	12.07	1.20
16:00:00	11.22	10.96	11.36	0.67
16:01:00	9.94	9.58	10.79	1.52
16:02:00	1.13	0.89	10.25	1.42
16:03:00	0.61	0.34	9.90	0.75
16:04:00	2.64	1.23	9.59	7.63
16:05:00	13.35	5.68	9.09	14.21
16:06:00	13.38	5.77	9.01	39.11
16:07:00	13.61	5.62	8.73	28.68
16:08:00	13.70	5.61	8.54	29.35
16:09:00	13.61	5.64	8.37	52.55
16:10:00	13.59	5.66	8.25	12.96
16:11:00	13.57	5.69	8.01	13.65
16:12:00	13.45	5.75	7.66	39.82
16:13:00	13.72	5.56	7.48	28.28
16:14:00	13.89	5.49	7.31	28.28
16:15:00	13.83	5.48	7.25	49.76
16:16:00	13.82	5.52	7.00	12.31
16:17:00	13.67	5.62	6.76	13.01
16:18:00	13.35	5.79	6.90	37.86
16:19:00	13.48	5.74	6.63	27.04
16:20:00	13.45	5.79	6.49	27.32
16:21:00	13.32	5.82	6.20	48.57
16:22:00	13.53	5.72	6.22	12.27
16:23:00	13.59	5.69	6.16	12.81
16:24:00	13.52	5.67	6.09	36.68

MoleDAQ Stripchart file

For Outlet EPA 23 Run 3 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
16:25:00	13.95	5.41	5.90	26.02
16:26:00	13.91	5.47	5.66	26.13
16:27:00	13.72	5.56	5.49	46.09
16:28:00	13.70	5.59	5.35	11.97
16:29:00	13.50	5.76	5.40	12.60
16:30:00	13.18	5.89	5.38	35.37
16:31:00	13.69	5.61	5.16	25.40
16:32:00	13.92	5.46	5.11	25.40
16:33:00	13.71	5.56	5.08	45.43
16:34:00	13.92	5.46	5.04	11.70
16:35:00	13.82	5.56	4.97	12.41
16:36:00	13.46	5.72	4.95	34.39
16:37:00	13.75	5.58	4.79	24.22
16:38:00	13.75	5.60	4.73	24.63
16:39:00	13.49	5.72	4.74	44.25
16:40:00	13.70	5.61	4.70	11.59
16:41:00	13.72	5.62	4.73	12.16
16:42:00	13.50	5.68	4.58	33.69
16:43:00	14.09	5.35	4.61	23.81
16:44:00	17.67	2.69	4.53	4.16
16:45:00	20.91	0.24	4.47	2.12
16:46:00	20.93	0.21	4.48	2.06
16:47:00	20.46	0.60	4.41	6.36
16:48:00	13.56	5.62	4.33	31.76
16:49:00	13.79	5.52	4.23	22.92
16:50:00	13.88	5.51	4.16	23.14
16:51:00	13.57	5.64	4.04	40.47
16:52:00	13.85	5.52	4.05	10.71
16:53:00	13.78	5.56	3.97	11.21
16:54:00	13.40	5.75	4.05	30.79
16:55:00	14.15	5.28	4.23	21.90
16:56:00	14.24	5.26	4.13	21.91
16:57:00	13.84	5.46	4.13	38.38
16:58:00	14.09	5.35	4.09	10.26
16:59:00	13.88	5.50	3.95	10.72
17:00:00	13.18	5.89	3.70	29.11
17:01:00	13.80	5.53	3.81	21.04
17:02:00	14.24	5.27	3.65	21.03
17:03:00	13.86	5.45	3.64	36.76
17:04:00	14.11	5.31	3.61	9.96
17:05:00	14.07	5.37	3.56	10.29
17:06:00	13.54	5.63	3.59	27.87

MoleDAQ Stripchart file

For Outlet EPA 23 Run 3 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
17:07:00	14.03	5.36	3.58	20.38
17:08:00	14.09	5.36	3.43	19.99
17:09:00	13.48	5.69	3.29	35.02
17:10:00	13.83	5.52	3.29	9.77
17:11:00	13.94	5.44	3.19	10.03
17:12:00	13.64	5.56	3.14	26.39
17:13:00	14.08	5.30	3.13	19.20
17:14:00	14.29	5.21	3.08	19.20
17:15:00	13.93	5.37	3.14	32.65
17:16:00	14.26	5.21	3.22	9.10
17:17:00	14.10	5.31	3.17	9.37
17:18:00	13.68	5.54	3.13	24.54
17:19:00	14.12	5.30	3.07	18.06
17:20:00	14.08	5.36	3.05	18.03
17:21:00	13.69	5.54	3.09	30.27
17:22:00	14.07	5.36	3.21	9.02
17:23:00	13.85	5.48	3.06	8.83
17:24:00	13.50	5.65	3.05	22.87
17:25:00	14.19	5.23	3.06	16.63
17:26:00	14.44	5.10	3.01	16.44
17:27:00	13.99	5.32	2.96	27.35
17:28:00	14.32	5.16	2.95	8.25
17:29:00	14.19	5.25	3.02	8.19
17:30:00	13.75	5.48	3.02	20.56
17:31:00	13.96	5.41	2.90	15.43
17:32:00	13.94	5.42	2.83	15.36
17:33:00	13.69	5.55	2.73	25.42
17:34:00	14.08	5.33	2.68	7.90
17:35:00	14.18	5.25	2.68	7.60
17:36:00	13.83	5.42	2.70	18.64
17:37:00	14.28	5.15	2.64	13.81
17:38:00	14.43	5.08	2.55	13.72
17:39:00	14.12	5.23	2.64	21.58
17:40:00	14.08	5.29	2.76	7.21
17:41:00	13.95	5.41	2.93	7.23
17:42:00	13.52	5.61	2.91	16.79
17:43:00	14.22	5.19	2.71	12.48
17:44:00	14.54	5.00	2.80	12.40
17:45:00	14.05	5.27	2.77	20.00
17:46:00	14.09	5.27	2.70	6.87
17:47:00	14.03	5.35	2.70	6.74
17:48:00	13.61	5.55	2.64	15.15

MoleDAQ Stripchart file

For Outlet EPA 23 Run 3 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
17:49:00	14.23	5.17	2.63	11.49
17:50:00	14.62	4.95	2.63	11.24
17:51:00	14.20	5.18	2.56	18.15
17:52:00	14.47	5.04	2.52	6.44
17:53:00	13.99	5.36	2.55	6.13
17:54:00	13.69	5.51	2.68	13.64
17:55:00	14.25	5.16	2.61	10.48
17:56:00	14.54	5.00	2.53	10.35
17:57:00	14.15	5.19	2.52	16.59
17:58:00	14.55	5.00	2.60	5.95
17:59:00	14.00	5.34	2.57	5.96
18:00:00	13.63	5.52	2.62	12.34
18:01:00	13.95	5.35	2.72	9.73
18:02:00	14.25	5.18	2.59	9.65
18:03:00	14.19	5.16	2.63	14.66
18:04:00	14.31	5.09	2.58	5.53
18:05:00	14.44	5.05	2.57	5.38
18:06:00	13.94	5.31	2.51	11.20
18:07:00	14.34	5.08	2.50	8.93
18:08:00	14.29	5.15	2.56	8.85
18:09:00	13.78	5.47	2.41	13.77
18:10:00	14.23	5.21	2.24	5.47
18:11:00	14.30	5.15	2.15	5.19
18:12:00	13.96	5.30	2.21	10.48
18:13:00	14.38	5.06	2.18	8.23
18:14:00	14.53	4.99	2.23	8.27
18:15:00	14.21	5.16	2.11	12.77
18:16:00	14.41	5.08	2.13	5.24
18:17:00	14.02	5.33	2.12	5.06
18:18:00	13.73	5.47	2.14	10.51
18:19:00	14.00	5.32	2.13	8.31
18:20:00	14.16	5.25	2.13	8.30
18:21:00	13.88	5.40	2.17	12.88
18:22:00	14.13	5.26	2.29	5.13
18:23:00	14.03	5.32	2.39	5.08
18:24:00	13.80	5.41	2.34	10.11
18:25:00	14.27	5.12	2.41	7.95
18:26:00	14.56	4.98	2.24	7.90
18:27:00	14.21	5.15	2.27	12.08
18:28:00	14.55	4.95	2.20	4.89
18:29:00	14.45	5.03	2.25	4.79
18:30:00	14.04	5.27	2.17	9.57

MoleDAQ Stripchart file

For Outlet EPA 23 Run 3 mol. weight
1/27/2022

Time	O2	CO2	THC In	THC Out
18:31:00	14.55	4.97	2.14	7.51
18:32:00	14.42	5.07	2.24	7.48
18:33:00	13.88	5.39	2.17	11.33
18:34:00	13.97	5.35	2.03	4.85
18:35:00	13.94	5.39	2.02	4.68
18:36:00	13.57	5.56	2.09	9.32
18:37:00	14.10	5.23	2.04	7.34
18:38:00	14.52	5.00	2.05	7.18
18:39:00	14.18	5.19	2.07	11.08
18:40:00	14.49	5.01	2.09	4.67
18:41:00	14.27	5.16	2.03	4.63
18:42:00	13.99	5.28	1.94	8.74
18:43:00	14.26	5.13	1.90	7.08
18:44:00	14.38	5.11	1.86	7.09
18:45:00	13.85	5.40	1.90	10.74
18:46:00	14.03	5.31	2.00	4.73
18:47:00	14.06	5.31	2.11	4.74
18:48:00	13.64	5.53	2.12	8.85
18:49:00	14.01	5.30	1.95	7.18
18:50:00	14.25	5.20	1.86	7.17
18:51:00	13.95	5.34	1.84	11.07
18:52:00	14.59	4.95	2.02	4.66
18:53:00	14.42	5.05	1.92	4.57
18:54:00	14.08	5.22	1.95	8.63
18:55:00	14.41	5.02	1.80	7.11
18:56:00	14.63	4.91	1.63	7.06
18:57:00	14.25	5.14	1.66	10.73
18:58:00	14.54	4.99	1.75	4.69
18:59:00	14.07	5.30	1.68	4.66
19:00:00	13.61	5.52	1.68	8.62
19:01:00	14.01	5.31	1.71	7.08
19:02:00	14.25	5.18	1.68	7.06
19:03:00	14.04	5.28	1.78	10.73
19:04:00	14.50	5.00	1.68	4.67
19:05:00	14.32	5.12	1.75	4.52
Average	**13.96**	**5.38**	**11.83**	**16.88**

Gray-shaded values excluded from average

CEM System Bias and Linearity
Correction Calculations
Ecolube Recovery

Run 4 for Inlet Method 4				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
	CALIBRATION SPAN GASES			
High Calibration Span:	23.04	22.49	Date: 1/27/2022	
Mid Calibration Span:	10.05	9.857	Time: 1441-1541	
Low Calibration Span:	0.000	0.000	Unit: RTO Inlet	
Mid Span % of Range:	43.6	43.8		
	SYSTEM CALIBRATION ERROR TEST			
High As Found Value:	23.10	22.55		
Mid As Found Value:	10.11	10.23		
Low As Found Value:	0.013	0.097		
High Calibration Error:	0.260	0.267	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.659	**< 2.0%**	**PASS**
Low Calibration Error:	0.056	0.431	**< 2.0%**	**PASS**
	SYSTEM BIAS CHECK AND DRIFT ASSESSMENT			
	Pre-Test Bias			
Zero Value:	0.433	0.215		
Span Value:	22.98	10.00		
	Post-Test Bias			
Zero Value:	0.330	0.150		
Span Value:	22.96	10.08		
System Initial Bias, %:	1.823	0.525	**< 5.0%**	**PASS**
System Initial Span, %:	-0.521	-1.032	**< 5.0%**	**PASS**
System Final Bias, %:	1.376	0.236	**< 5.0%**	**PASS**
System Final Span, %:	-0.608	-0.667	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.447	0.289	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.087	0.365	**< 3.0%**	**PASS**
	RAW TEST AVERAGES			
Raw Concentrations:	16.95	3.30		
% of High Calibration Span:	73.6	14.7		
Corrected Averages	**16.90**	**3.12**		

Note: Raw (not drift corrected) Tedlar bag concentrations used in calculations.

CEM System Bias and Linearity
Correction Calculations
Ecolube Recovery

Run 3 for Outlet Method 23				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
CALIBRATION SPAN GASES				
High Calibration Span:	23.04	22.49	Date: 1/27/2022	
Mid Calibration Span:	10.05	9.857	Time: 1441-1905	
Low Calibration Span:	0.000	0.000	Unit: RTO Outlet	
Mid Span % of Range:	43.6	43.8		
SYSTEM CALIBRATION ERROR TEST				
High As Found Value:	23.10	22.55		
Mid As Found Value:	10.11	10.23		
Low As Found Value:	0.013	0.097		
High Calibration Error:	0.260	0.267	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.659	**< 2.0%**	**PASS**
Low Calibration Error:	0.056	0.431	**< 2.0%**	**PASS**
SYSTEM BIAS CHECK AND DRIFT ASSESSMENT				
	Pre-Test Bias			
Zero Value:	0.433	0.215		
Span Value:	22.98	9.998		
	Post-Test Bias			
Zero Value:	0.433	0.215		
Span Value:	22.98	9.998		
System Initial Bias, %:	1.823	0.525	**< 5.0%**	**PASS**
System Initial Span, %:	-0.521	-1.032	**< 5.0%**	**PASS**
System Final Bias, %:	1.823	0.525	**< 5.0%**	**PASS**
System Final Span, %:	-0.521	-1.032	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.000	0.000	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.000	0.000	**< 3.0%**	**PASS**
RAW TEST AVERAGES				
Raw Concentrations:	13.80	4.34		
% of High Calibration Span:	59.9	19.3		
Corrected Averages	**13.66**	**4.15**		

Note: Test data should not exceed high calibration span; however, analyzer range can be set higher.

CEM System Bias and Linearity
Correction Calculations
Ecolube Recovery

Run 3 for Outlet Method 25A				
PARAMETER	**O_2**	**CO_2**	**CRITERIA**	**STATUS**
CALIBRATION SPAN GASES				
High Calibration Span:	23.04	22.49	Date: 1/27/2022	
Mid Calibration Span:	10.05	9.857	Time: 1441-1541	
Low Calibration Span:	0.000	0.000	Unit: RTO Outlet	
Mid Span % of Range:	43.6	43.8		
SYSTEM CALIBRATION ERROR TEST				
High As Found Value:	23.10	22.55		
Mid As Found Value:	10.11	10.23		
Low As Found Value:	0.013	0.097		
High Calibration Error:	0.260	0.267	**< 2.0%**	**PASS**
Mid Calibration Error:	0.260	1.659	**< 2.0%**	**PASS**
Low Calibration Error:	0.056	0.431	**< 2.0%**	**PASS**
SYSTEM BIAS CHECK AND DRIFT ASSESSMENT				
Pre-Test Bias				
Zero Value:	0.433	0.215		
Span Value:	22.98	9.998		
Post-Test Bias				
Zero Value:	0.433	0.215		
Span Value:	22.98	9.998		
System Initial Bias, %:	1.823	0.525	**< 5.0%**	**PASS**
System Initial Span, %:	-0.521	-1.032	**< 5.0%**	**PASS**
System Final Bias, %:	1.823	0.525	**< 5.0%**	**PASS**
System Final Span, %:	-0.521	-1.032	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.000	0.000	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.000	0.000	**< 3.0%**	**PASS**
RAW TEST AVERAGES				
Raw Concentrations:	13.29	5.92		
% of High Calibration Span:	57.7	26.3		
Corrected Averages	**13.14**	**5.75**		

Note: Test data should not exceed high calibration span; however, analyzer range can be set higher.

From Montrose's field notes:

1/27/2022

Run 2 inlet Tedlar bag: 18.76% O_2, 1.96% CO_2

Run 3 inlet Tedlar bag: 15.83% O_2, 4.02% CO_2

Run 4 inlet Tedlar bag: 16.95% O_2, 3.3% CO_2

Final bias at 19:14:

Zero measured as 0.33% O_2, 0.15% CO_2

High O_2/CO_2 measured as 22.96% O_2, 10.08% CO_2

Appendix A.5
PCDD, PCDF, PCB & PAH Calculations/Results

SOURCE TEST DATA SUMMARY
Polychlorinated Dibenzodioxins and Dibenzofurans (PCDD/PCDF)

Client	Ecolube
Unit / Location	RTO Outlet
Stack area, square feet	2.074
Regulation District	EPA
Reference temperature, °F	68
Reference pressure, psi	14.7

	Test number	Field Blank	1-PCDD	2-PCDD	3-PCDD	Average
	Date	--	1/26/2022	1/27/2022	1/27/2022	--
	Start / Stop time	--	1410-1827	0927-1339	1441-1905	--
	SAMPLE TRAIN DATA					
	Meter box number/ID	--	MB33	MB33	MB33	--
	Nozzle diameter, inches	--	0.3167	0.3167	0.3167	0.3167
	Sample time, minutes	--	240.0	240.0	240.0	240.0
	Pitot coefficient	--	0.84	0.84	0.84	0.84
	Meter calibration, Yd	--	1.0059	1.0059	1.0059	1.0059
	Barometric pressure, in Hg	--	30.25	30.37	30.37	30.33
	Meter box volume, acf	--	176.015	164.334	163.454	167.934
	Impinger liquid mass, g	--	203.6	218.6	204.5	208.9
	Meter temperature, °F	--	62.9	58.2	55.5	58.9
	Meter pressure, (Delta H) iwg	--	1.594	1.400	1.469	1.488
	Velocity head, (Delta P) iwg	--	0.314	0.266	0.286	0.289
	Static pressure, iwg	--	-0.23	-0.19	-0.20	-0.21
	Stack temperature, °F	--	404.4	405.0	393.1	400.8
	ANALYZER DATA					
	O_2, % volume dry	--	14.40	13.12	13.66	13.73
	CO_2, % volume dry	--	4.81	5.71	4.15	4.89
	VOLUMETRIC FLOW RATE					
1a	Standard sample volume, dscf	--	181.347	171.439	171.438	174.742
1b	Water vapor volume, scf	--	9.600	10.307	9.642	9.850
	B_{ws} (moisture fraction), non-dimensional	--	0.0503	0.0567	0.0532	0.0534
	B_{ws} (moisture fraction saturated), non-dimensional	--	NA	NA	NA	NA
1c	B_{ws} (moisture fraction applicable), non-dimensional	--	0.0503	0.0567	0.0532	0.0534
1d	Stack gas molecular weight, dry	--	29.346	29.438	29.210	29.331
1e	Stack gas molecular weight, wet	--	28.775	28.790	28.613	28.726
1f	Absolute stack pressure, in Hg	--	30.233	30.356	30.355	30.315
1g	Stack gas velocity, ft/sec	--	40.123	36.817	38.063	38.334
1h	Q (stack flow rate), acf/min	--	4,993	4,581	4,736	4,770
1i	Q_{sw} (stack flow rate), wscf/min	--	3,082	2,837	2,974	2,964
1j	Q_{sd} (stack flow rate, based on pitot), dscf/min	--	2,927	2,676	2,816	2,806
	Isokinetic Ratio (%)	--	97.9	101.2	96.2	98.4

LAB RESULTS

		Field Blank		1-PCDD		2-PCDD		3-PCDD		Average
2378-Cl4-Dibenzo-p-dioxin, pg	ND	2.63	ND	3.88	ND	3.92	ND	4.30	ND	4.03
12378-Cl5-Dibenzo-p-dioxin, pg	ND	3.10	ND	5.67	ND	6.35	ND	6.46	ND	6.16
123478-Cl6-Dibenzo-p-dioxin, pg	ND	2.77	ND	5.57	ND	4.40	ND	5.01	ND	4.99
123678-Cl6-Dibenzo-p-dioxin, pg	ND	3.00	ND	5.81	ND	4.37	ND	5.06	ND	5.08
123789-Cl6-Dibenzo-p-dioxin, pg	ND	3.11	ND	5.35	ND	4.06	ND	5.26	ND	4.89
1234678-Cl7-Dibenzo-p-dioxin, pg	ND	3.67		78.8		62.6		76.3		72.6
12346789-Cl8-Dibenzo-p-dioxin, pg	ND	5.86		167		159		191		172
2378-Cl4-Dibenzofuran, pg	ND	1.92		72.4		29.4	ND	3.43	DLL	35.1
12378-Cl5-Dibenzofuran, pg	ND	2.55	ND	4.93	ND	3.40	ND	3.92	ND	4.08
23478-Cl5-Dibenzofuran, pg	ND	2.67	ND	5.00	ND	3.44	ND	4.04	ND	4.16
123478-Cl6-Dibenzofuran, pg	ND	1.87	ND	3.13	ND	2.87	ND	2.90	ND	2.97
123678-Cl6-Dibenzofuran, pg	ND	2.01	ND	3.10	ND	2.77	ND	2.84	ND	2.90
234678-Cl6-Dibenzofuran, pg	ND	1.79	ND	2.99	ND	2.61	ND	2.80	ND	2.80
123789-Cl6-Dibenzofuran, pg	ND	2.19	ND	3.53	ND	3.15	ND	3.14	ND	3.27
1234678-Cl7-Dibenzofuran, pg	ND	2.46	ND	2.67	ND	3.00	ND	3.87	ND	3.18
1234789-Cl7-Dibenzofuran, pg	ND	2.92	ND	2.87	ND	3.54	ND	5.10	ND	3.84
12346789-Cl8-Dibenzofuran, pg	ND	5.39	ND	7.11	ND	4.89	ND	5.69	ND	5.90
Total Cl4-Dibenzo-p-dioxins, pg	ND	2.63		202		18.1		9.68		76.6
Total Cl5-Dibenzo-p-dioxins, pg	ND	3.10		77.7		11.0	ND	6.46	DLL	31.7
Total Cl6-Dibenzo-p-dioxins, pg	ND	2.96		75.1		43.7		34.6		51.1
Total Cl7-Dibenzo-p-dioxins, pg	ND	3.67		146		109		141		132
Total Cl8-Dibenzo-p-dioxins, pg	ND	5.86		167		159		191		172
Total Cl4-Dibenzofurans, pg	ND	1.92		164		58.1	ND	3.43	DLL	75.2
Total Cl5-Dibenzofurans, pg	ND	2.61	ND	4.96	ND	3.42	ND	3.98	ND	4.12
Total Cl6-Dibenzofurans, pg	ND	1.96	ND	3.19	ND	2.85	ND	2.92	ND	2.99
Total Cl7-Dibenzofurans, pg	ND	2.69	ND	2.77	ND	3.27	ND	4.48	ND	3.51
Total C18-Dibenzofurans, pg	ND	5.39	ND	7.11	ND	4.89	ND	5.69	ND	5.90

EMISSIONS

2378-Cl4-Dibenzo-p-dioxin(2378 TCDD), ng/m^3	ND	5.32E-04	ND	7.56E-04	ND	8.07E-04	ND	8.86E-04	ND	8.16E-04
2378-Cl4-Dibenzo-p-dioxin(2378 TCDD), lb/hr	ND	5.58E-12	ND	8.28E-12	ND	8.09E-12	ND	9.33E-12	ND	8.57E-12
12378-Cl5-Dibenzo-p-dioxin(12378 PeCDD), ng/m^3	ND	6.26E-04	ND	1.10E-03	ND	1.31E-03	ND	1.33E-03	ND	1.25E-03
12378-Cl5-Dibenzo-p-dioxin(12378 PeCDD), lb/hr	ND	6.58E-12	ND	1.21E-11	ND	1.31E-11	ND	1.40E-11	ND	1.31E-11
123478-Cl6-Dibenzo-p-dioxin(123478 HxCDD), ng/m^3	ND	5.60E-04	ND	1.08E-03	ND	9.06E-04	ND	1.03E-03	ND	1.01E-03
123478-Cl6-Dibenzo-p-dioxin(123478 HxCDD), lb/hr	ND	5.88E-12	ND	1.19E-11	ND	9.08E-12	ND	1.09E-11	ND	1.06E-11
123678-Cl6-Dibenzo-p-dioxin(123678 HxCDD), ng/m^3	ND	6.06E-04	ND	1.13E-03	ND	9.00E-04	ND	1.04E-03	ND	1.02E-03
123678-Cl6-Dibenzo-p-dioxin(123678 HxCDD), lb/hr	ND	6.37E-12	ND	1.24E-11	ND	9.02E-12	ND	1.10E-11	ND	1.08E-11
123789-Cl6-Dibenzo-p-dioxin(123789 HxCDD), ng/m^3	ND	6.29E-04	ND	1.04E-03	ND	8.36E-04	ND	1.08E-03	ND	9.87E-04
123789-Cl6-Dibenzo-p-dioxin(123789 HxCDD), lb/hr	ND	6.60E-12	ND	1.14E-11	ND	8.38E-12	ND	1.14E-11	ND	1.04E-11
1234678-Cl7-Dibenzo-p-dioxin(1234678 HpCDD), ng/m^3	ND	7.42E-04		1.53E-02		1.29E-02		1.57E-02		1.47E-02
1234678-Cl7-Dibenzo-p-dioxin(1234678 HpCDD), lb/hr	ND	7.79E-12		1.68E-10		1.29E-10		1.66E-10		1.54E-10
12346789-Cl8-Dibenzo-p-dioxin(OCDD), ng/m^3	ND	1.18E-03		3.25E-02		3.28E-02		3.93E-02		3.49E-02
12346789-Cl8-Dibenzo-p-dioxin(OCDD), lb/hr	ND	1.24E-11		3.56E-10		3.28E-10		4.15E-10		3.66E-10
2378-Cl4-Dibenzofuran(2378 TCDF), ng/m^3	ND	3.88E-04		1.41E-02		6.06E-03	ND	7.07E-04	DLL	6.95E-03
2378-Cl4-Dibenzofuran(2378 TCDF), lb/hr	ND	4.08E-12		1.54E-10		6.07E-11	ND	7.45E-12	DLL	7.42E-11
12378-Cl5-Dibenzofuran(12378 PeCDF), ng/m^3	ND	5.15E-04	ND	9.60E-04	ND	7.00E-04	ND	8.07E-04	ND	8.23E-04
12378-Cl5-Dibenzofuran(12378 PeCDF), lb/hr	ND	5.41E-12	ND	1.05E-11	ND	7.01E-12	ND	8.51E-12	ND	8.68E-12
23478-Cl5-Dibenzofuran(23478 PeCDF), ng/m^3	ND	5.40E-04	ND	9.74E-04	ND	7.09E-04	ND	8.32E-04	ND	8.38E-04
23478-Cl5-Dibenzofuran(23478 PeCDF), lb/hr	ND	5.67E-12	ND	1.07E-11	ND	7.10E-12	ND	8.77E-12	ND	8.84E-12
123478-Cl6-Dibenzofuran(123478 HxCDF), ng/m^3	ND	3.78E-04	ND	6.10E-04	ND	5.91E-04	ND	5.97E-04	ND	5.99E-04
123478-Cl6-Dibenzofuran(123478 HxCDF), lb/hr	ND	3.97E-12	ND	6.68E-12	ND	5.92E-12	ND	6.29E-12	ND	6.30E-12
123678-Cl6-Dibenzofuran(123678 HxCDF), ng/m^3	ND	4.06E-04	ND	6.04E-04	ND	5.71E-04	ND	5.85E-04	ND	5.86E-04
123678-Cl6-Dibenzofuran(123678 HxCDF), lb/hr	ND	4.27E-12	ND	6.61E-12	ND	5.71E-12	ND	6.16E-12	ND	6.16E-12
234678-Cl6-Dibenzofuran(234678 HxCDF), ng/m^3	ND	3.62E-04	ND	5.82E-04	ND	5.38E-04	ND	5.77E-04	ND	5.66E-04
234678-Cl6-Dibenzofuran(234678 HxCDF), lb/hr	ND	3.80E-12	ND	6.38E-12	ND	5.38E-12	ND	6.08E-12	ND	5.95E-12
123789-Cl6-Dibenzofuran(123789 HxCDF), ng/m^3	ND	4.43E-04	ND	6.87E-04	ND	6.49E-04	ND	6.47E-04	ND	6.61E-04
123789-Cl6-Dibenzofuran(123789 HxCDF), lb/hr	ND	4.65E-12	ND	7.53E-12	ND	6.50E-12	ND	6.82E-12	ND	6.95E-12
1234678-Cl7-Dibenzofuran(1234678 HpCDF), ng/m^3	ND	4.97E-04	ND	5.20E-04	ND	6.18E-04	ND	7.97E-04	ND	6.45E-04
1234678-Cl7-Dibenzofuran(1234678 HpCDF),lb/hr	ND	5.22E-12	ND	5.69E-12	ND	6.19E-12	ND	8.40E-12	ND	6.76E-12
1234789-Cl7-Dibenzofuran(1234789 HpCDF), ng/m^3	ND	5.90E-04	ND	5.59E-04	ND	7.29E-04	ND	1.05E-03	ND	7.80E-04
1234789-Cl7-Dibenzofuran(1234789 HpCDF), lb/hr	ND	6.20E-12	ND	6.12E-12	ND	7.30E-12	ND	1.11E-11	ND	8.17E-12
12346789-Cl8-Dibenzofuran(OCDF), ng/m^3	ND	1.09E-03	ND	1.38E-03	ND	1.01E-03	ND	1.17E-03	ND	1.19E-03
12346789-Cl8-Dibenzofuran(OCDF), lb/hr	ND	1.14E-11	ND	1.52E-11	ND	1.01E-11	ND	1.24E-11	ND	1.25E-11
Total Cl4-Dibenzo-p-dioxins(TCDD), ng/m^3	ND	5.32E-04		3.93E-02		3.73E-03		1.99E-03		1.50E-02
Total Cl4-Dibenzo-p-dioxins(TCDD), lb/hr	ND	5.58E-12		4.31E-10		3.73E-11		2.10E-11		1.63E-10
Total Cl5-Dibenzo-p-dioxins(PeCDD), ng/m^3	ND	6.26E-04		1.51E-02		2.27E-03	ND	1.33E-03	DLL	6.24E-03
Total Cl5-Dibenzo-p-dioxins(PeCDD), lb/hr	ND	6.58E-12		1.66E-10		2.27E-11	ND	1.40E-11	DLL	6.75E-11
Total Cl6-Dibenzo-p-dioxins(HxCDD), ng/m^3	ND	5.98E-04		1.46E-02		9.00E-03		7.13E-03		1.03E-02
Total Cl6-Dibenzo-p-dioxins(HxCDD), lb/hr	ND	6.28E-12		1.60E-10		9.02E-11		7.51E-11		1.08E-10
Total Cl7-Dibenzo-p-dioxins(HpCDD), ng/m^3	ND	7.42E-04		2.84E-02		2.25E-02		2.90E-02		2.66E-02
Total Cl7-Dibenzo-p-dioxins(HxCDD), lb/hr	ND	7.79E-12		3.11E-10		2.25E-10		3.06E-10		2.81E-10
Total Cl8-Dibenzo-p-dioxins(OCDD), ng/m^3	ND	1.18E-03		3.25E-02		3.28E-02		3.93E-02		3.49E-02
Total Cl8-Dibenzo-p-dioxins(OCDD), lb/hr	ND	1.24E-11		3.56E-10		3.28E-10		4.15E-10		3.66E-10
Total Cl4-Dibenzofurans(TCDF), ng/m^3	ND	3.88E-04		3.19E-02		1.20E-02	ND	7.07E-04	DLL	1.49E-02
Total Cl4-Dibenzofurans(TCDF), lb/hr	ND	4.08E-12		3.50E-10		1.20E-10	ND	7.45E-12	DLL	1.59E-10
Total Cl5-Dibenzofurans(PeCDF), ng/m^3	ND	5.27E-04	ND	9.66E-04	ND	7.04E-04	ND	8.20E-04	ND	8.30E-04
Total Cl5-Dibenzofurans(PeCDF), lb/hr	ND	5.54E-12	ND	1.06E-11	ND	7.06E-12	ND	8.64E-12	ND	8.76E-12
Total Cl6-Dibenzofurans(HxCDF), ng/m^3	ND	3.96E-04	ND	6.21E-04	ND	5.87E-04	ND	6.01E-04	ND	6.03E-04
Total Cl6-Dibenzofurans(HxCDF), lb/hr	ND	4.16E-12	ND	6.80E-12	ND	5.88E-12	ND	6.34E-12	ND	6.34E-12
Total Cl7-Dibenzofurans(HpCDF), ng/m^3	ND	5.44E-04	ND	5.39E-04	ND	6.74E-04	ND	9.23E-04	ND	7.12E-04
Total Cl7-Dibenzofurans(HpCDF), lb/hr	ND	5.71E-12	ND	5.91E-12	ND	6.75E-12	ND	9.72E-12	ND	7.46E-12
Total Cl8-Dibenzofuran(OCDF), ng/m^3	ND	1.09E-03	ND	1.38E-03	ND	1.01E-03	ND	1.17E-03	ND	1.19E-03
Total Cl8-Dibenzofuran(OCDF), lb/hr	ND	1.14E-11	ND	1.52E-11	ND	1.01E-11	ND	1.24E-11	ND	1.25E-11
Total PCDD, ng/m^3	DLL	3.68E-03	DLL	1.30E-01	DLL	7.02E-02	DLL	7.88E-02	DLL	9.30E-02
Total PCDD, lb/hr	DLL	3.87E-11	DLL	1.42E-09	DLL	7.03E-10	DLL	8.31E-10	DLL	9.86E-10
Total PCDF, ng/m^3	DLL	2.94E-03	DLL	3.54E-02	DLL	1.49E-02	DLL	4.22E-03	DLL	1.82E-02
Total PCDF, lb/hr	DLL	3.09E-11	DLL	3.88E-10	DLL	1.50E-10	DLL	4.45E-11	DLL	1.94E-10
Total PCDD/PCDF, ng/m^3	DLL	6.63E-03	DLL	1.65E-01	DLL	8.51E-02	DLL	8.31E-02	DLL	1.11E-01
Total PCDD/PCDF, lb/hr	DLL	6.96E-11	DLL	1.81E-09	DLL	8.53E-10	DLL	8.75E-10	DLL	1.18E-09

SOURCE TEST DATA SUMMARY
Polycyclic Aromatic Hydrocarbons (PAH)

Client	Ecolube
Unit / Location	RTO Outlet
A (stack area), ft^2	2.073942025
T_{ref} (reference temperature), °F	68

	Test number		Field Blank		Run 1		Run 2		Run 3		Average
	Date		--		1/26/2022		1/27/2022		1/27/2022		--
	Start / Stop time		--		1410-1827		0927-1339		1441-1905		--
1j	Q_{ds} (stack flow rate), dscfm		2,806		2,927		2,676		2,816		2,806
	Total		Field Blank		Run 1		Run 2		Run 3		Average
1	Naphthalene, µg		9.72		106		162		130		133
2	2-Methylnaphthalene, µg		1.92		102		107		94.8		101
3	Acenaphthylene, µg	ND	0.00450		2.71		2.19		2.61		2.50
4	Acenaphthene, µg	ND	0.00419		1.10		0.849		1.09		1.01
5	Fluorene, µg		0.0379		5.39		3.21		4.10		4.23
6	Phenanthrene, µg		0.110		15.9		9.40		11.5		12.3
7	Anthracene, µg		0.0108		2.22	ND	0.0103		1.86	DLL	1.36
8	Fluoranthene, µg		0.0442		4.05		1.92		3.39		3.12
9	Pyrene, µg		0.0876		3.00		0.884		2.35		2.08
10	Benzo(a)anthracene, µg		0.0135		0.968		0.314		0.857		0.713
11	Chrysene, µg		0.0152		1.21		0.816		1.17		1.07
12	Benzo(b)fluoranthene, µg		0.0217		0.415		0.230		0.420		0.355
13	Benzo(k)fluoranthene, µg		0.00896		0.0844		0.0540		0.0695		0.0693
14	Benzo(e)pyrene, µg		0.0127		0.105		0.0459		0.110		0.0870
15	Benzo(a)pyrene, µg		0.00941		0.0252	ND	0.0110	ND	0.00829	DLL	0.0148
16	Perylene, µg	ND	0.00516	ND	0.0104	ND	0.0130	ND	0.0258	ND	0.0164
17	Indeno(1,2,3-cd)pyrene, µg	ND	0.00598	ND	0.00953	ND	0.0118	ND	0.0115	ND	0.0109
18	Dibenzo(a,h)anthracene, µg	ND	0.00716	ND	0.0103	ND	0.0114	ND	0.00958	ND	0.0104
19	Benzo(g,h,i)perylene, µg		0.0340		0.0331		0.0431		0.0679		0.0480

1	Naphthalene, ng/sampling train		1.06E+05		1.62E+05		1.30E+05		1.33E+05
	Naphthalene, ng/dscm		2.06E+04		3.34E+04		2.68E+04		2.69E+04
	Naphthalene, lb/hr		2.26E-04		3.34E-04		2.82E-04		2.81E-04
2	2-Methylnaphthalene, ng/sampling train		1.02E+05		1.07E+05		9.48E+04		1.01E+05
	2-Methylnaphthalene, ng/dscm		1.99E+04		2.20E+04		1.95E+04		2.05E+04
	2-Methylnaphthalene, lb/hr		2.18E-04		2.21E-04		2.06E-04		2.15E-04
3	Acenaphthylene, ng/sampling train		2.71E+03		2.19E+03		2.61E+03		2.50E+03
	Acenaphthylene, ng/dscm		5.28E+02		4.51E+02		5.38E+02		5.05E+02
	Acenaphthylene, lb/hr		5.78E-06		4.52E-06		5.67E-06		5.32E-06
4	Acenaphthene, ng/sampling train		1.10E+03		8.49E+02		1.09E+03		1.01E+03
	Acenaphthene, ng/dscm		2.14E+02		1.75E+02		2.24E+02		2.05E+02
	Acenaphthene, lb/hr		2.35E-06		1.75E-06		2.37E-06		2.15E-06
5	Fluorene, ng/sampling train		5.39E+03		3.21E+03		4.10E+03		4.23E+03
	Fluorene, ng/dscm		1.05E+03		6.61E+02		8.44E+02		8.52E+02
	Fluorene, lb/hr		1.15E-05		6.62E-06		8.90E-06		9.01E-06
6	Phenanthrene, ng/sampling train		1.59E+04		9.40E+03		1.15E+04		1.23E+04
	Phenanthrene, ng/dscm		3.10E+03		1.94E+03		2.37E+03		2.47E+03
	Phenanthrene, lb/hr		3.39E-05		1.94E-05		2.50E-05		2.61E-05
7	Anthracene, ng/sampling train		2.22E+03	ND	1.03E+01		1.86E+03	DLL	1.36E+03
	Anthracene, ng/dscm		4.32E+02	ND	2.12E+00		3.83E+02	DLL	2.72E+02
	Anthracene, lb/hr		4.74E-06	ND	2.13E-08		4.04E-06	DLL	2.93E-06
8	Fluoranthene, ng/sampling train		4.05E+03		1.92E+03		3.39E+03		3.12E+03
	Fluoranthene, ng/dscm		7.89E+02		3.95E+02		6.98E+02		6.27E+02
	Fluoranthene, lb/hr		8.64E-06		3.96E-06		7.36E-06		6.65E-06
9	Pyrene, ng/sampling train		3.00E+03		8.84E+02		2.35E+03		2.08E+03
	Pyrene, ng/dscm		5.84E+02		1.82E+02		4.84E+02		4.17E+02
	Pyrene, lb/hr		6.40E-06		1.82E-06		5.10E-06		4.44E-06
10	Benzo(a)anthracene, ng/sampling train		9.68E+02		3.14E+02		8.57E+02		7.13E+02
	Benzo(a)anthracene, ng/dscm		1.88E+02		6.47E+01		1.77E+02		1.43E+02
	Benzo(a)anthracene, lb/hr		2.06E-06		6.48E-07		1.86E-06		1.52E-06
11	Chrysene, ng/sampling train		1.21E+03		8.16E+02		1.17E+03		1.07E+03
	Chrysene, ng/dscm		2.36E+02		1.68E+02		2.41E+02		2.15E+02
	Chrysene, lb/hr		2.58E-06		1.68E-06		2.54E-06		2.27E-06
12	Benzo(b)fluoranthene, ng/sampling train		4.15E+02		2.30E+02		4.20E+02		3.55E+02
	Benzo(b)fluoranthene, ng/dscm		8.08E+01		4.74E+01		8.65E+01		7.16E+01
	Benzo(b)fluoranthene, lb/hr		8.85E-07		4.75E-07		9.12E-07		7.57E-07
13	Benzo(k)fluoranthene, ng/sampling train		8.44E+01		5.40E+01		6.95E+01		6.93E+01
	Benzo(k)fluoranthene, ng/dscm		1.64E+01		1.11E+01		1.43E+01		1.40E+01
	Benzo(k)fluoranthene, lb/hr		1.80E-07		1.11E-07		1.51E-07		1.47E-07
14	Benzo(e)pyrene, ng/sampling train		1.05E+02		4.59E+01		1.10E+02		8.70E+01
	Benzo(e)pyrene, ng/dscm		2.04E+01		9.45E+00		2.27E+01		1.75E+01
	Benzo(e)pyrene, lb/hr		2.24E-07		9.47E-08		2.39E-07		1.86E-07
15	Benzo(a)pyrene, ng/sampling train		2.52E+01	ND	1.10E+01	ND	8.29E+00	DLL	1.48E+01
	Benzo(a)pyrene, ng/dscm		4.91E+00	ND	2.27E+00	ND	1.71E+00	DLL	2.96E+00
	Benzo(a)pyrene, lb/hr		5.37E-08	ND	2.27E-08	ND	1.80E-08	DLL	3.15E-08
16	Perylene, ng/sampling train	ND	1.04E+01	ND	1.30E+01	ND	2.58E+01	ND	1.64E+01
	Perylene, ng/dscm	ND	2.02E+00	ND	2.68E+00	ND	5.31E+00	ND	3.34E+00
	Perylene, lb/hr	ND	2.22E-08	ND	2.68E-08	ND	5.60E-08	ND	3.50E-08
17	Indeno(1,2,3-cd)pyrene, ng/sampling train	ND	9.53E+00	ND	1.18E+01	ND	1.15E+01	ND	1.09E+01
	Indeno(1,2,3-cd)pyrene, ng/dscm	ND	1.86E+00	ND	2.43E+00	ND	2.37E+00	ND	2.22E+00
	Indeno(1,2,3-cd)pyrene, lb/hr	ND	2.03E-08	ND	2.43E-08	ND	2.50E-08	ND	2.32E-08
18	Dibenzo(a,h)anthracene, ng/sampling train	ND	1.03E+01	ND	1.14E+01	ND	9.58E+00	ND	1.04E+01
	Dibenzo(a,h)anthracene, ng/dscm	ND	2.01E+00	ND	2.35E+00	ND	1.97E+00	ND	2.11E+00
	Dibenzo(a,h)anthracene, lb/hr	ND	2.20E-08	ND	2.35E-08	ND	2.08E-08	ND	2.21E-08
19	Benzo(g,h,i)perylene, ng/sampling train		3.31E+01		4.31E+01		6.79E+01		4.80E+01
	Benzo(g,h,i)perylene, ng/dscm		6.44E+00		8.88E+00		1.40E+01		9.77E+00
	Benzo(g,h,i)perylene, lb/hr		7.06E-08		8.89E-08		1.47E-07		1.02E-07
	Total PAH suite, ng/dscm	DLL	4.77E+04	DLL	5.95E+04	DLL	5.24E+04	DLL	5.32E+04
	Total PAH suite, lb/hr	DLL	5.23E-04	DLL	5.96E-04	DLL	5.52E-04	DLL	5.57E-04

Note: The Total PAH suite results are determined using 0.5 x the detection limit where applicable (for contributing PAH compounds found to be below the detection limit) per Oregon Source Sampling Manual 2.11c. Individual PAH results are determined using the analytical results as reported by the lab (i.e. full detection limit where applicable). Results denoted as ND were below the detection limit as defined by the analytical results. Results denoted as DLL were a mix of above DL and below DL results, so total PAH result is denoted as DLL.

SOURCE TEST DATA SUMMARY
Polychlorinated Biphenyl (PCB)

Client	Ecolube
Unit / Location	RTO Outlet
A (stack area), ft^2	2.073942025
T_{ref} (reference temperature), °F	68

			Field Blank		Run 1		Run 2		Run 3		Average
	Test number		Field Blank		Run 1		Run 2		Run 3		Average
	Date		--		1/26/2022		1/27/2022		1/27/2022		--
	Start / Stop time		--		1410-1827		0927-1339		1441-1905		--
1j	Q_{ds} (stack flow rate), dscfm		2,806		2,927		2,676		2,816		2,806
	Total		Field Blank		Run 1		Run 2		Run 3		Average
1	PCB-5/8 [2,4'-DiCB], µg		2.08E-04		1.38E-02		2.22E-03		9.13E-04		5.64E-03
2	PCB-18 [2,2',5-TrCB], µg		1.75E-04		9.69E-03		9.65E-04		5.50E-04		3.74E-03
3	PCB-28 [2,4,4'-TrCB], µg		1.18E-04		7.82E-03		1.23E-03		4.39E-04		3.16E-03
4	PCB-44 [2,2',3,5'-TeCB], µg		7.92E-05		3.32E-03		2.65E-04		2.06E-04		1.26E-03
5	PCB-52/69 [2,2',5,5'-TeCB], µg	ND	7.10E-05		3.40E-03		3.46E-04		2.28E-04		1.32E-03
6	PCB-66/76 [2,3',4,4'-TeCB], µg		2.31E-05		1.62E-03		1.67E-04		1.15E-04		6.34E-04
7	PCB-77 [3,3',4,4'-TeCB], µg	ND	3.48E-06		1.73E-04	ND	4.11E-05	ND	1.92E-05	DLL	7.78E-05
8	PCB-81 [3,4,4',5-TeCB], µg	ND	3.64E-06		1.45E-05	ND	4.68E-06	ND	6.23E-06	DLL	8.47E-06
9	PCB-90/101 [2,2',4,5,5'-PeCB], µg	ND	4.31E-05		1.57E-03		1.81E-04		1.83E-04		6.45E-04
10	PCB-105 [2,3,3',4,4'-PeCB], µg	ND	4.09E-06		3.55E-04		5.46E-05		5.00E-05		1.53E-04
11	PCB-106/118 [2,3',4,4',5-PeCB], µg	ND	3.46E-05		9.45E-04	ND	1.15E-04		1.09E-04	DLL	3.90E-04
12	PCB-114 [2,3,4,4',5-PeCB], µg	ND	4.25E-06	ND	1.68E-05	ND	8.18E-06	ND	8.30E-06	ND	1.11E-05
13	PCB-123 [2',3,4,4',5-PeCB], µg	ND	3.30E-06		2.40E-05	ND	5.89E-06	ND	5.81E-06	DLL	1.19E-05
14	PCB-126 [3,3',4,4',5-PeCB], µg	ND	4.44E-06	ND	1.84E-05	ND	8.47E-06	ND	9.09E-06	ND	1.20E-05
15	PCB-128/162 [2,2',3,3',4,4'-HxCB], µg	ND	5.61E-06		8.34E-05	ND	1.23E-05	ND	1.32E-05	DLL	3.63E-05
16	PCB-138/163/164 [2,2',3,4,4',5'-HxCB], µg	ND	2.68E-05		5.81E-04		9.71E-05		1.02E-04		2.60E-04
17	PCB-153 [2,2',4,4',5,5'-HxCB], µg		2.32E-05		5.50E-04		7.69E-05	ND	7.60E-05	DLL	2.34E-04
18	PCB-156 [2,3,3',4,4',5-HxCB], µg	ND	4.60E-06		5.27E-05	ND	1.04E-05	ND	1.34E-05	DLL	2.55E-05
19	PCB-157 [2,3,3',4,4',5'-HxCB], µg	ND	5.05E-06	ND	1.23E-05	ND	1.13E-05	ND	1.30E-05	ND	1.22E-05
20	PCB-167 [2,3',4,4',5,5'-HxCB], µg	ND	4.53E-06	ND	1.08E-05	ND	1.00E-05	ND	1.12E-05	ND	1.07E-05
21	PCB-169 [3,3',4,4',5,5'-HxCB], µg	ND	5.78E-06	ND	1.86E-05	ND	1.48E-05	ND	1.70E-05	ND	1.68E-05
22	PCB-170 [2,2',3,3',4,4',5-HpCB], µg	ND	7.61E-06		6.23E-05	ND	1.21E-05	ND	1.91E-05	DLL	3.12E-05
23	PCB-180 [2,2',3,4,4',5,5'-HpCB], µg	ND	7.37E-06		1.70E-04		5.44E-05	ND	7.11E-05	DLL	9.85E-05
24	PCB-182/187 [2,2',3,4',5,5',6-HpCB], µg	ND	5.86E-06	ND	9.60E-05	ND	2.37E-05	ND	9.29E-06	ND	4.30E-05
25	PCB-189 [2,3,3',4,4',5,5'-HpCB], µg	ND	5.23E-06	ND	8.52E-06	ND	1.43E-05	ND	1.84E-05	ND	1.37E-05
26	PCB-195 [2,2',3,3',4,4',5,6-OcCB], µg	ND	9.54E-06	ND	1.65E-05	ND	2.40E-05	ND	2.94E-05	ND	2.33E-05
27	PCB-206 [2,2',3,3',4,4',5,5',6-NoCB], µg	ND	1.21E-05	ND	1.46E-05	ND	3.32E-05	ND	4.78E-05	ND	3.19E-05
28	PCB-209 [2,2',3,3',4,4',5,5',6,6'-DeCB], µg	ND	8.29E-06	ND	1.02E-05	ND	1.77E-05	ND	3.01E-05	ND	1.93E-05
	Total monoCB, µg		6.71E-05		6.17E-03		5.56E-03		5.06E-03		5.60E-03
	Total diCB, µg		6.26E-04		3.60E-02		7.75E-03		3.37E-03		1.57E-02
	Total triCB, µg		7.49E-04		5.10E-02		6.74E-03		3.14E-03		2.03E-02
	Total tetraCB, µg		5.36E-04		3.16E-02		2.36E-03		1.97E-03		1.20E-02
	Total pentaCB, µg		1.58E-04		8.35E-03		7.08E-04		7.43E-04		3.27E-03
	Total hexaCB, µg		5.25E-05		2.77E-03		3.10E-04		2.53E-04		1.11E-03
	Total heptaCB, µg	ND	8.98E-06		4.93E-04	ND	5.44E-05	ND	8.67E-05	DLL	2.11E-04
	Total octaCB, µg	ND	9.54E-06		2.14E-05	ND	2.40E-05	ND	2.94E-05	DLL	2.49E-05
	Total nonaCB, µg	ND	1.21E-05	ND	1.46E-05	ND	3.32E-05	ND	4.78E-05	ND	3.19E-05
	DecaCB, µg	ND	8.29E-06	ND	1.02E-05	ND	1.77E-05	ND	3.01E-05	ND	1.93E-05
	Total PCB, µg		2.19E-03		1.36E-01		2.35E-02		1.45E-02		5.80E-02
1	PCB-5/8 [2,4'-DiCB], ng/sampling train				1.38E+01		2.22E+00		9.13E-01		5.64E+00
	PCB-5/8 [2,4'-DiCB], ng/dscm				2.69E+00		4.57E-01		1.88E-01		1.11E+00
	PCB-5/8 [2,4'-DiCB], lb/hr				2.94E-08		4.58E-09		1.98E-09		1.20E-08
2	PCB-18 [2,2',5-TrCB], ng/sampling train				9.69E+00		9.65E-01		5.50E-01		3.74E+00
	PCB-18 [2,2',5-TrCB], ng/dscm				1.89E+00		1.99E-01		1.13E-01		7.33E-01
	PCB-18 [2,2',5-TrCB], lb/hr				2.07E-08		1.99E-09		1.19E-09		7.95E-09
3	PCB-28 [2,4,4'-TrCB], ng/sampling train				7.82E+00		1.23E+00		4.39E-01		3.16E+00
	PCB-28 [2,4,4'-TrCB], ng/dscm				1.52E+00		2.53E-01		9.04E-02		6.22E-01
	PCB-28 [2,4,4'-TrCB], lb/hr				1.67E-08		2.54E-09		9.53E-10		6.72E-09
4	PCB-44 [2,2',3,5'-TeCB], ng/sampling train				3.32E+00		2.65E-01		2.06E-01		1.26E+00
	PCB-44 [2,2',3,5'-TeCB], ng/dscm				6.46E-01		5.46E-02		4.24E-02		2.48E-01
	PCB-44 [2,2',3,5'-TeCB], lb/hr				7.08E-09		5.47E-10		4.47E-10		2.69E-09
5	PCB-52/69 [2,2',5,5'-TeCB], ng/sampling train				3.40E+00		3.46E-01		2.28E-01		1.32E+00
	PCB-52/69 [2,2',5,5'-TeCB], ng/dscm				6.62E-01		7.13E-02		4.70E-02		2.60E-01
	PCB-52/69 [2,2',5,5'-TeCB], lb/hr				7.25E-09		7.14E-10		4.95E-10		2.82E-09
6	PCB-66/76 [2,3',4,4'-TeCB], ng/sampling train				1.62E+00		1.67E-01		1.15E-01		6.34E-01
	PCB-66/76 [2,3',4,4'-TeCB], ng/dscm				3.15E-01		3.44E-02		2.37E-02		1.25E-01
	PCB-66/76 [2,3',4,4'-TeCB], lb/hr				3.46E-09		3.45E-10		2.50E-10		1.35E-09
7	PCB-77 [3,3',4,4'-TeCB], ng/sampling train				1.73E-01	ND	4.11E-02	ND	1.92E-02	DLL	7.78E-02
	PCB-77 [3,3',4,4'-TeCB], ng/dscm				3.37E-02	ND	8.47E-03	ND	3.95E-03	DLL	1.54E-02
	PCB-77 [3,3',4,4'-TeCB], lb/hr				3.69E-10	ND	8.48E-11	ND	4.17E-11	DLL	1.65E-10
8	PCB-81 [3,4,4',5-TeCB], ng/sampling train				1.45E-02	ND	4.68E-03	ND	6.23E-03	DLL	8.47E-03
	PCB-81 [3,4,4',5-TeCB], ng/dscm				2.82E-03	ND	9.64E-04	ND	1.28E-03	DLL	1.69E-03
	PCB-81 [3,4,4',5-TeCB], lb/hr				3.09E-11	ND	9.66E-12	ND	1.35E-11	DLL	1.80E-11
9	PCB-90/101 [2,2',4,5,5'-PeCB], ng/sampling train				1.57E+00		1.81E-01		1.83E-01		6.45E-01
	PCB-90/101 [2,2',4,5,5'-PeCB], ng/dscm				3.06E-01		3.73E-02		3.77E-02		1.27E-01
	PCB-90/101 [2,2',4,5,5'-PeCB], lb/hr				3.35E-09		3.73E-10		3.97E-10		1.37E-09
10	PCB-105 [2,3,3',4,4'-PeCB], ng/sampling train				3.55E-01		5.46E-02		5.00E-02		1.53E-01
	PCB-105 [2,3,3',4,4'-PeCB], ng/dscm				6.91E-02		1.12E-02		1.03E-02		3.02E-02
	PCB-105 [2,3,3',4,4'-PeCB], lb/hr				7.57E-10		1.13E-10		1.09E-10		3.26E-10
11	PCB-106/118 [2,3',4,4',5-PeCB], ng/sampling train				9.45E-01	ND	1.15E-01		1.09E-01	DLL	3.90E-01
	PCB-106/118 [2,3',4,4',5-PeCB], ng/dscm				1.84E-01	ND	2.37E-02		2.24E-02	DLL	7.67E-02
	PCB-106/118 [2,3',4,4',5-PeCB], lb/hr				2.02E-09	ND	2.37E-10		2.37E-10	DLL	8.30E-10

12	PCB-114 [2,3,4,4',5-PeCB], ng/sampling train	ND	1.68E-02	ND	8.18E-03	ND	8.30E-03	ND	1.11E-02
	PCB-114 [2,3,4,4',5-PeCB], ng/dscm	ND	3.27E-03	ND	1.68E-03	ND	1.71E-03	ND	2.22E-03
	PCB-114 [2,3,4,4',5-PeCB], lb/hr	ND	3.58E-11	ND	1.69E-11	ND	1.80E-11	ND	2.36E-11
13	PCB-123 [2',3,4,4',5-PeCB], ng/sampling train		2.40E-02	ND	5.89E-03	ND	5.81E-03	DLL	1.19E-02
	PCB-123 [2',3,4,4',5-PeCB], ng/dscm		4.67E-03	ND	1.21E-03	ND	1.20E-03	DLL	2.36E-03
	PCB-123 [2',3,4,4',5-PeCB], lb/hr		5.12E-11	ND	1.22E-11	ND	1.26E-11	DLL	2.53E-11
14	PCB-126 [3,3',4,4',5-PeCB], ng/sampling train	ND	1.84E-02	ND	8.47E-03	ND	9.09E-03	ND	1.20E-02
	PCB-126 [3,3',4,4',5-PeCB], ng/dscm	ND	3.58E-03	ND	1.74E-03	ND	1.87E-03	ND	2.40E-03
	PCB-126 [3,3',4,4',5-PeCB], lb/hr	ND	3.92E-11	ND	1.75E-11	ND	1.97E-11	ND	2.55E-11
15	PCB-128/162 [2,2',3,3',4,4'-HxCB], ng/sampling train		8.34E-02	ND	1.23E-02	ND	1.32E-02	DLL	3.63E-02
	PCB-128/162 [2,2',3,3',4,4'-HxCB], ng/dscm		1.62E-02	ND	2.53E-03	ND	2.72E-03	DLL	7.16E-03
	PCB-128/162 [2,2',3,3',4,4'-HxCB], lb/hr		1.78E-10	ND	2.54E-11	ND	2.87E-11	DLL	7.73E-11
16	PCB-138/163/164 [2,2',3,4,4',5'-HxCB], ng/sampling train		5.81E-01		9.71E-02		1.02E-01		2.60E-01
	PCB-138/163/164 [2,2',3,4,4',5'-HxCB], ng/dscm		1.13E-01		2.00E-02		2.10E-02		5.14E-02
	PCB-138/163/164 [2,2',3,4,4',5'-HxCB], lb/hr		1.24E-09		2.00E-10		2.21E-10		5.54E-10
17	PCB-153 [2,2',4,4',5,5'-HxCB], ng/sampling train		5.50E-01		7.69E-02	ND	7.60E-02	DLL	2.34E-01
	PCB-153 [2,2',4,4',5,5'-HxCB], ng/dscm		1.07E-01		1.58E-02	ND	1.57E-02	DLL	4.62E-02
	PCB-153 [2,2',4,4',5,5'-HxCB], lb/hr		1.17E-09		1.59E-10	ND	1.65E-10	DLL	4.99E-10
18	PCB-156 [2,3,3',4,4',5-HxCB], ng/sampling train		5.27E-02	ND	1.04E-02	ND	1.34E-02	DLL	2.55E-02
	PCB-156 [2,3,3',4,4',5-HxCB], ng/dscm		1.03E-02	ND	2.14E-03	ND	2.76E-03	DLL	5.05E-03
	PCB-156 [2,3,3',4,4',5-HxCB], lb/hr		1.12E-10	ND	2.15E-11	ND	2.91E-11	DLL	5.43E-11
19	PCB-157 [2,3,3',4,4',5'-HxCB], ng/sampling train	ND	1.23E-02	ND	1.13E-02	ND	1.30E-02	ND	1.22E-02
	PCB-157 [2,3,3',4,4',5'-HxCB], ng/dscm	ND	2.39E-03	ND	2.33E-03	ND	2.68E-03	ND	2.47E-03
	PCB-157 [2,3,3',4,4',5'-HxCB], lb/hr	ND	2.62E-11	ND	2.33E-11	ND	2.82E-11	ND	2.59E-11
20	PCB-167 [2,3',4,4',5,5'-HxCB], ng/sampling train	ND	1.08E-02	ND	1.00E-02	ND	1.12E-02	ND	1.07E-02
	PCB-167 [2,3',4,4',5,5'-HxCB], ng/dscm	ND	2.10E-03	ND	2.06E-03	ND	2.31E-03	ND	2.16E-03
	PCB-167 [2,3',4,4',5,5'-HxCB], lb/hr	ND	2.30E-11	ND	2.06E-11	ND	2.43E-11	ND	2.27E-11
21	PCB-169 [3,3',4,4',5,5'-HxCB], ng/sampling train	ND	1.86E-02	ND	1.48E-02	ND	1.70E-02	ND	1.68E-02
	PCB-169 [3,3',4,4',5,5'-HxCB], ng/dscm	ND	3.62E-03	ND	3.05E-03	ND	3.50E-03	ND	3.39E-03
	PCB-169 [3,3',4,4',5,5'-HxCB], lb/hr	ND	3.97E-11	ND	3.05E-11	ND	3.69E-11	ND	3.57E-11
22	PCB-170 [2,2',3,3',4,4',5-HpCB], ng/sampling train		6.23E-02	ND	1.21E-02	ND	1.91E-02	DLL	3.12E-02
	PCB-170 [2,2',3,3',4,4',5-HpCB], ng/dscm		1.21E-02	ND	2.49E-03	ND	3.93E-03	DLL	6.19E-03
	PCB-170 [2,2',3,3',4,4',5-HpCB], lb/hr		1.33E-10	ND	2.50E-11	ND	4.15E-11	DLL	6.64E-11
23	PCB-180 [2,2',3,4,4',5,5'-HpCB], ng/sampling train		1.70E-01		5.44E-02	ND	7.11E-02	DLL	9.85E-02
	PCB-180 [2,2',3,4,4',5,5'-HpCB], ng/dscm		3.31E-02		1.12E-02	ND	1.46E-02	DLL	1.96E-02
	PCB-180 [2,2',3,4,4',5,5'-HpCB], lb/hr		3.63E-10		1.12E-10	ND	1.54E-10	DLL	2.10E-10
24	PCB-182/187 [2,2',3,4',5,5',6-HpCB], ng/sampling train	ND	9.60E-02	ND	2.37E-02	ND	9.29E-03	ND	4.30E-02
	PCB-182/187 [2,2',3,4',5,5',6-HpCB], ng/dscm	ND	1.87E-02	ND	4.88E-03	ND	1.91E-03	ND	8.50E-03
	PCB-182/187 [2,2',3,4',5,5',6-HpCB], lb/hr	ND	2.05E-10	ND	4.89E-11	ND	2.02E-11	ND	9.13E-11
25	PCB-189 [2,3,3',4,4',5,5'-HpCB], µg, ng/sampling train	ND	8.52E-03	ND	1.43E-02	ND	1.84E-02	ND	1.37E-02
	PCB-189 [2,3,3',4,4',5,5'-HpCB], µg, ng/dscm	ND	1.66E-03	ND	2.95E-03	ND	3.79E-03	ND	2.80E-03
	PCB-189 [2,3,3',4,4',5,5'-HpCB], µg, lb/hr	ND	1.82E-11	ND	2.95E-11	ND	3.99E-11	ND	2.92E-11
26	PCB-195 [2,2',3,3',4,4',5,6-OcCB], ng/sampling train	ND	1.65E-02	ND	2.40E-02	ND	2.94E-02	ND	2.33E-02
	PCB-195 [2,2',3,3',4,4',5,6-OcCB], ng/dscm	ND	3.21E-03	ND	4.94E-03	ND	6.06E-03	ND	4.74E-03
	PCB-195 [2,2',3,3',4,4',5,6-OcCB], lb/hr	ND	3.52E-11	ND	4.95E-11	ND	6.38E-11	ND	4.95E-11
27	PCB-206 [2,2',3,3',4,4',5,5',6-NoCB], ng/sampling train	ND	1.46E-02	ND	3.32E-02	ND	4.78E-02	ND	3.19E-02
	PCB-206 [2,2',3,3',4,4',5,5',6-NoCB], ng/dscm	ND	2.84E-03	ND	6.84E-03	ND	9.85E-03	ND	6.51E-03
	PCB-206 [2,2',3,3',4,4',5,5',6-NoCB], lb/hr	ND	3.11E-11	ND	6.85E-11	ND	1.04E-10	ND	6.78E-11
28	PCB-209 [2,2',3,3',4,4',5,5',6,6'-DeCB], ng/sampling train	ND	1.02E-02	ND	1.77E-02	ND	3.01E-02	ND	1.93E-02
	PCB-209 [2,2',3,3',4,4',5,5',6,6'-DeCB], ng/dscm	ND	1.99E-03	ND	3.65E-03	ND	6.20E-03	ND	3.94E-03
	PCB-209 [2,2',3,3',4,4',5,5',6,6'-DeCB], lb/hr	ND	2.18E-11	ND	3.65E-11	ND	6.53E-11	ND	4.12E-11
	Total monoCB, ng/sampling train		6.17E+00		5.56E+00		5.06E+00		5.60E+00
	Total monoCB, ng/dscm		1.20E+00		1.15E+00		1.04E+00		1.13E+00
	Total monoCB, lb/hr		1.32E-08		1.15E-08		1.10E-08		1.19E-08
	Total diCB, ng/sampling train		3.60E+01		7.75E+00		3.37E+00		1.57E+01
	Total diCB, ng/dscm		7.01E+00		1.60E+00		6.94E-01		3.10E+00
	Total diCB, lb/hr		7.68E-08		1.60E-08		7.32E-09		3.34E-08
	Total triCB, ng/sampling train		5.10E+01		6.74E+00		3.14E+00		2.03E+01
	Total triCB, ng/dscm		9.93E+00		1.39E+00		6.47E-01		3.99E+00
	Total triCB, lb/hr		1.09E-07		1.39E-08		6.82E-09		4.32E-08
	Total tetraCB, ng/sampling train		3.16E+01		2.36E+00		1.97E+00		1.20E+01
	Total tetraCB, ng/dscm		6.15E+00		4.86E-01		4.06E-01		2.35E+00
	Total tetraCB, lb/hr		6.74E-08		4.87E-09		4.28E-09		2.55E-08
	Total pentaCB, ng/sampling train		8.35E+00		7.08E-01		7.43E-01		3.27E+00
	Total pentaCB, ng/dscm		1.63E+00		1.46E-01		1.53E-01		6.42E-01
	Total pentaCB, lb/hr		1.78E-08		1.46E-09		1.61E-09		6.96E-09
	Total hexaCB, ng/sampling train		2.77E+00		3.10E-01		2.53E-01		1.11E+00
	Total hexaCB, ng/dscm		5.39E-01		6.38E-02		5.21E-02		2.18E-01
	Total hexaCB, lb/hr		5.91E-09		6.40E-10		5.49E-10		2.37E-09
	Total heptaCB, ng/sampling train		4.93E-01	ND	5.44E-02	ND	8.67E-02	DLL	2.11E-01
	Total heptaCB, ng/dscm		9.60E-02	ND	1.12E-02	ND	1.79E-02	DLL	4.17E-02
	Total heptaCB, lb/hr		1.05E-09	ND	1.12E-10	ND	1.88E-10	DLL	4.51E-10
	Total octaCB, ng/sampling train		2.14E-02	ND	2.40E-02	ND	2.94E-02	DLL	2.49E-02
	Total octaCB, ng/dscm		4.17E-03	ND	4.94E-03	ND	6.06E-03	DLL	5.06E-03
	Total octaCB, lb/hr		4.56E-11	ND	4.95E-11	ND	6.38E-11	DLL	5.30E-11
	Total nonaCB, ng/sampling train	ND	1.46E-02	ND	3.32E-02	ND	4.78E-02	ND	3.19E-02
	Total nonaCB, ng/dscm	ND	2.84E-03	ND	6.84E-03	ND	9.85E-03	ND	6.51E-03
	Total nonaCB, lb/hr	ND	3.11E-11	ND	6.85E-11	ND	1.04E-10	ND	6.78E-11

DecaCB, ng/sampling train	ND	1.02E-02	ND	1.77E-02	ND	3.01E-02	ND	1.93E-02
DecaCB, ng/dscm	ND	1.99E-03	ND	3.65E-03	ND	6.20E-03	ND	3.94E-03
DecaCB, lb/hr	ND	2.18E-11	ND	3.65E-11	ND	6.53E-11	ND	4.12E-11
Total PCB, ng/sampling train		1.36E+02		2.35E+01		1.45E+01		5.80E+01
Total PCB, ng/dscm		2.65E+01		4.84E+00		2.99E+00		1.14E+01
Total PCB, lb/hr		2.90E-07		4.85E-08		3.15E-08		1.23E-07

SOURCE TEST DATA SUMMARY
Chlorobenzene and Chlorophenol

Client	Ecolube
Unit / Location	RTO Outlet
A (stack area), ft^2	2.073942025
T_{ref} (reference temperature), °F	68

		Field Blank		Run 1		Run 2		Run 3		Average
Test number		Field Blank		Run 1		Run 2		Run 3		Average
Date		--		1/26/2022		1/27/2022		1/27/2022		--
Start / Stop time		--		1410-1827		0927-1339		1441-1905		--
1j Q_{ds} (stack flow rate), dscfm		2,806		2,927		2,676		2,816		2,806
Total		Field Blank		Run 1		Run 2		Run 3		Average
2-Chlorophenol, µg	ND	0.425	ND	0.425	ND	0.425	ND	0.425	ND	0.425
1,3-Dichlorobenzene, µg	ND	0.566	ND	0.566	ND	0.566	ND	0.566	ND	0.566
1,4-Dichlorobenzene (CCC), µg	ND	0.940	ND	0.940	ND	0.940	ND	0.940	ND	0.940
1,2-Dichlorobenzene, µg	ND	1.07	ND	1.07	ND	1.07	ND	1.07	ND	1.07
2,4-Dichlorophenol, µg	ND	0.835	ND	0.835	ND	0.835	ND	0.835	ND	0.835
1,2,4-Trichlorobenzene, µg	ND	0.720	ND	0.720	ND	0.720	ND	0.720	ND	0.720
2,4,6-Trichlorophenol (CCC), µg	ND	0.842	ND	0.842	ND	0.842	ND	0.842	ND	0.842
2,4,5-Trichlorophenol, µg	ND	1.00	ND	1.00	ND	1.00	ND	1.00	ND	1.00
2,3,4,6-Tetrachlorophenol, µg	ND	1.37	ND	1.37	ND	1.37	ND	1.37	ND	1.37
Hexachlorobenzene, µg	ND	1.28	ND	1.28	ND	1.28	ND	1.28	ND	1.28
Pentachlorophenol (CCC), µg	ND	0.894	ND	0.894	ND	0.894	ND	0.894	ND	0.894

		Run 1		Run 2		Run 3		Average
2-Chlorophenol, ng/sampling train	ND	4.25E+02	ND	4.25E+02	ND	4.25E+02	ND	4.25E+02
2-Chlorophenol, ng/dscm	ND	8.28E+01	ND	8.75E+01	ND	8.75E+01	ND	8.59E+01
2-Chlorophenol, lb/hr	ND	9.06E-07	ND	8.77E-07	ND	9.23E-07	ND	9.02E-07
1,3-Dichlorobenzene, ng/sampling train	ND	5.66E+02	ND	5.66E+02	ND	5.66E+02	ND	5.66E+02
1,3-Dichlorobenzene, ng/dscm	ND	1.10E+02	ND	1.17E+02	ND	1.17E+02	ND	1.14E+02
1,3-Dichlorobenzene, lb/hr	ND	1.21E-06	ND	1.17E-06	ND	1.23E-06	ND	1.20E-06
1,4-Dichlorobenzene (CCC), ng/sampling train	ND	9.40E+02	ND	9.40E+02	ND	9.40E+02	ND	9.40E+02
1,4-Dichlorobenzene (CCC), ng/dscm	ND	1.83E+02	ND	1.94E+02	ND	1.94E+02	ND	1.90E+02
1,4-Dichlorobenzene (CCC), lb/hr	ND	2.00E-06	ND	1.94E-06	ND	2.04E-06	ND	1.99E-06
1,2-Dichlorobenzene, ng/sampling train	ND	1.07E+03	ND	1.07E+03	ND	1.07E+03	ND	1.07E+03
1,2-Dichlorobenzene, ng/dscm	ND	2.08E+02	ND	2.20E+02	ND	2.20E+02	ND	2.16E+02
1,2-Dichlorobenzene, lb/hr	ND	2.28E-06	ND	2.21E-06	ND	2.32E-06	ND	2.27E-06
2,4-Dichlorophenol, ng/sampling train	ND	8.35E+02	ND	8.35E+02	ND	8.35E+02	ND	8.35E+02
2,4-Dichlorophenol, ng/dscm	ND	1.63E+02	ND	1.72E+02	ND	1.72E+02	ND	1.69E+02
2,4-Dichlorophenol, lb/hr	ND	1.78E-06	ND	1.72E-06	ND	1.81E-06	ND	1.77E-06
1,2,4-Trichlorobenzene, ng/sampling train	ND	7.20E+02	ND	7.20E+02	ND	7.20E+02	ND	7.20E+02
1,2,4-Trichlorobenzene, ng/dscm	ND	1.40E+02	ND	1.48E+02	ND	1.48E+02	ND	1.46E+02
1,2,4-Trichlorobenzene, lb/hr	ND	1.54E-06	ND	1.49E-06	ND	1.56E-06	ND	1.53E-06
2,4,6-Trichlorophenol (CCC), ng/sampling train	ND	8.42E+02	ND	8.42E+02	ND	8.42E+02	ND	8.42E+02
2,4,6-Trichlorophenol (CCC), ng/dscm	ND	1.64E+02	ND	1.73E+02	ND	1.73E+02	ND	1.70E+02
2,4,6-Trichlorophenol (CCC), lb/hr	ND	1.80E-06	ND	1.74E-06	ND	1.83E-06	ND	1.79E-06
2,4,5-Trichlorophenol, ng/sampling train	ND	1.00E+03	ND	1.00E+03	ND	1.00E+03	ND	1.00E+03
2,4,5-Trichlorophenol, ng/dscm	ND	1.95E+02	ND	2.06E+02	ND	2.06E+02	ND	2.02E+02
2,4,5-Trichlorophenol, lb/hr	ND	2.13E-06	ND	2.06E-06	ND	2.17E-06	ND	2.12E-06
2,3,4,6-Tetrachlorophenol, ng/sampling train	ND	1.37E+03	ND	1.37E+03	ND	1.37E+03	ND	1.37E+03
2,3,4,6-Tetrachlorophenol, ng/dscm	ND	2.67E+02	ND	2.82E+02	ND	2.82E+02	ND	2.77E+02
2,3,4,6-Tetrachlorophenol, lb/hr	ND	2.92E-06	ND	2.83E-06	ND	2.97E-06	ND	2.91E-06
Hexachlorobenzene, ng/sampling train	ND	1.28E+03	ND	1.28E+03	ND	1.28E+03	ND	1.28E+03
Hexachlorobenzene, ng/dscm	ND	2.49E+02	ND	2.64E+02	ND	2.64E+02	ND	2.59E+02
Hexachlorobenzene, lb/hr	ND	2.73E-06	ND	2.64E-06	ND	2.78E-06	ND	2.72E-06
Pentachlorophenol (CCC), ng/sampling train	ND	8.94E+02	ND	8.94E+02	ND	8.94E+02	ND	8.94E+02
Pentachlorophenol (CCC), ng/dscm	ND	1.74E+02	ND	1.84E+02	ND	1.84E+02	ND	1.81E+02
Pentachlorophenol (CCC), lb/hr	ND	1.91E-06	ND	1.84E-06	ND	1.94E-06	ND	1.90E-06

Appendix A.6
VOC Calculations/Results

SOURCE TEST DATA SUMMARY

Client	Ecolube Recovery
Unit / Location	RTO Inlet
Stack area, square feet	1.623
Reference temperature, °F	68

	Test number	2	3	4	Average
	Date	1/26/2022	1/27/2022	1/27/2022	--
	Start / Stop time	1720-1820	0927-1027	1441-1541	--
	SAMPLE TRAIN DATA				
	Meter box number/ID	MB31	MB31	MB31	--
	Pitot coefficient	0.84	0.84	0.84	0.84
	Meter calibration, Yd	0.9902	0.9902	0.9902	0.9902
	Barometric pressure, in Hg	30.25	30.37	30.37	30.33
	Meter box volume, acf	27.105	27.498	28.959	27.854
	Impinger liquid volume, ml	7.1	16.2	18.1	13.8
	Meter temperature, °F	51.4	49.0	54.8	51.7
	Meter pressure, (Delta H) iwg	1.000	1.000	1.000	1.000
	Velocity head, (Delta P) iwg	0.3427	0.3442	0.3301	0.3390
	Static pressure, iwg	-1.80	-1.50	-2.20	-1.83
	Stack temperature, °F	331.7	346.9	268.4	315.7
	ANALYZER DATA				
	O_2, % volume dry	18.76	15.83	16.95	17.18
	CO_2, % volume dry	1.96	4.02	3.30	3.09
	THC emissions as propane ppm volume wet	191	321	458	323
	VOLUMETRIC FLOW RATE				
1a	Standard sample volume, dscf	28.066	28.721	29.909	28.899
1b	Water vapor volume, scf	0.3348	0.7638	0.8534	0.6507
1c	Moisture fraction, nondimensional	0.0118	0.0259	0.0277	0.0218
1d	Stack gas molecular weight, dry	29.064	29.276	29.206	29.182
1e	Stack gas molecular weight, wet	28.934	28.984	28.895	28.938
1f	Absolute stack pressure, in Hg	30.118	30.260	30.208	30.195
1g	Stack gas velocity, ft/sec	40.070	40.412	37.688	39.390
1h	Stack flow rate, acfm	3,902	3,935	3,670	3,836
1i	Stack flow rate, wscfm	2,620	2,604	2,686	2,636
1j	Stack flow rate - based on pitot, dscfm	2,589	2,537	2,611	2,579
	EMISSIONS				
	THC concentrations, ppm volume dry	193	329	471	331
	THC mass emissions, lb/hr as propane	3.43	5.73	8.45	5.87

SOURCE TEST DATA SUMMARY

Client	Ecolube Recovery
Unit / Location	RTO Outlet
Stack area, square feet	2.074
Reference temperature, °F	68

Test number	1	2	3	Average
Date	1/26/2022	1/27/2022	1/27/2022	--
Start / Stop time	1720-1820	0927-1027	1441-1541	--
SAMPLE TRAIN DATA				
Meter box number/ID	MB33	MB33	MB33	--
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	1.0059	1.0059	1.0059	1.0059
Barometric pressure, in Hg	30.25	30.37	30.37	30.33
Meter box volume, acf	176.015	164.334	163.454	167.934
Impinger liquid volume, ml	203.6	218.6	204.5	208.9
Meter temperature, °F	62.9	58.2	55.5	58.9
Meter pressure, (Delta H) iwg	1.594	1.400	1.469	1.488
Velocity head, (Delta P) iwg	0.3142	0.2656	0.2860	0.2886
Static pressure, iwg	-0.23	-0.19	-0.20	-0.21
Stack temperature, °F	404.4	405.0	393.1	400.8
ANALYZER DATA				
O_2, % volume dry	14.57	13.37	13.14	13.69
CO_2, % volume dry	4.68	5.57	5.75	5.33
THC emissions as propane ppm volume wet	12.81	20.71	26.15	19.89
VOLUMETRIC FLOW RATE				
1a Standard sample volume, dscf	181.347	171.439	171.438	174.742
1b Water vapor volume, scf	9.5997	10.3070	9.6422	9.8496
1c Moisture fraction, nondimensional	0.0503	0.0567	0.0532	0.0534
1d Stack gas molecular weight, dry	29.331	29.426	29.446	29.401
1e Stack gas molecular weight, wet	28.762	28.778	28.836	28.792
1f Absolute stack pressure, in Hg	30.233	30.356	30.355	30.315
1g Stack gas velocity, ft/sec	40.132	36.825	37.915	38.291
1h Stack flow rate, acfm	4,994	4,582	4,718	4,765
1i Stack flow rate, wscfm	3,082	2,838	2,963	2,961
1j Stack flow rate - based on pitot, dscfm	2,927	2,677	2,805	2,803
EMISSIONS				
THC concentrations, ppm volume dry	13.5	22.0	27.6	21.0
THC mass emissions, lb/hr as propane	0.271	0.404	0.532	0.402
Destruction efficiency, %	92.09	92.96	93.71	92.92

Appendix A.7
Example Calculations

MONTROSE AIR QUALITY SERVICES

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name:	Ecolube	**Project number:**	006AS-011833
Computed by:	A Vella	**Calculation date:**	2022-04-04
Run number:	RTO Out R1 (EPA 23)		

SAMPLE TRAIN DATA

Meter calibration factor, Y_d	1.0059	Y
Stack area, square feet	2.074	A_s
Pitot Coefficient	0.84	C_p
Barometric pressure, in. Hg	30.25	P_{bar}
Meter box volume, acf	176.015	V_m
Impinger liquid volume, g	203.6	V_{lc}
Meter temperature, °R	522.9	T_m = (°F plus 460)
Meter pressure, (delta H) iwg	1.594	ΔH
Velocity head, (delta P) iwg	0.314	ΔP
Static pressure, iwg	-0.23	P_{sg}
Stack temperature, °R	864.4	T_s = (°F plus 460)
Stack O_2, % volume dry	14.4	O_2
Stack CO_2, % volume dry	4.81	CO_2
Stack N_2, % volume dry	80.79	$N_2 = (100 - \%O_2 - \%CO_2)$
Nozzle area, square feet	0.000547	$A_n = \pi (D_n / 2)^2 (1\ ft/ 12\ in)^2$
PM sampling time, minutes	240	Θ
Reference temperature, °R	528	T_{std} = (°F plus 460)

Note: The results calculated in the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

1 VOLUMETRIC FLOW RATE

a. Standard sample gas volume, dscf

$$V_{m\,std} = 17.64 \times (V_m)(Y)\frac{\left[P_{bar} + \left(\frac{\Delta H}{13.6}\right)\right]}{(T_m)}$$

$$V_{m\,std} = \frac{17.64 \times (176.015)(1.0059)[30.25+(1.594)/(13.6)]}{522.9}$$

$V_{m\,std}$ = 181.380 dscf

b. Water vapor volume, scf

$$V_{w\,std} = (0.04715)(V_{lc})\left(\frac{T_{std}}{528}\right)$$

$$V_{w\,std} = \frac{(0.04715)(203.6)(528)}{(528)}$$

$V_{w\,std}$ = 9.600 scf

c. Moisture content, non-dimensional

$$B_{ws} = \left(\frac{V_{w\,std}}{V_{m\,std} + V_{w\,std}}\right)$$

$$B_{ws} = \frac{(9.6)}{(181.38 + 9.6)}$$

B_{ws} = 0.0503 moisture content (multiply by 100 for % by volume)

d. Stack gas molecular weight, lb/lb mole (dry)

MW_{dry} = [0.44(%CO_2)] + [0.32(%O_2)] + [0.28(%N_2)]

MW_{dry} = [0.44(4.81)] + [0.32(14.4)] + [0.28(80.79)]

MW_{dry} = 29.346 lb/lb mole

e. Stack gas molecular weight, lb/lb mole (wet)

MW_{wet} = [MW_{dry}(1-B_{ws})] + [18(B_{ws})]

MW_{wet} = [29.346(1-0.0503)] + [18(0.0503)]

MW_{wet} = 28.775 lb/lb mole

f. Absolute stack pressure, in Hg

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

P_s = 30.25 + (-0.23/13.6)

P_s = 30.233 in. Hg

g. Stack velocity, ft/sec

$$v_s = (85.49)(C_p)(\sqrt{\Delta P})\sqrt{\frac{T_s}{(P_s)(MW_{wet})}}$$

$$v_s = (85.49)(0.84)\sqrt{\frac{(0.314)(864.4)}{(30.233)(28.775)}}$$

v_s = 40.111 ft/sec

h. Actual stack flow rate, acfm

$$Q = (v_s)(A_s)(60\ min/hr)$$

Q = $(40.111)(2.074)(60)$

Q = $\underline{4{,}991}$ acfm

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (v_s)(A_s)(60\ min/hr)\left(\frac{T_{std}}{T_s}\right)\left(\frac{P_s}{P_{std}}\right)$$

Q_{ws} = $(40.111)(2.074)(60)(528/864.4)(30.233/29.92)$

Q_{ws} = $\underline{3{,}081}$ wscfm

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (v_s)(A_s)(60\ min/hr)(1 - B_{ws})\left(\frac{T_{std}}{T_s}\right)\left(\frac{P_s}{P_{std}}\right)$$

Q_{ds} = $(40.111)(2.074)(60)(1\text{-}0.0503)(528/864.4)(30.233/29.92)$

Q_{ds} = $\underline{2{,}926}$ dscfm

k. Percent Isokinetic, %

$$I = \frac{(T_s)(V_{m\ std})(P_{std})(100)}{(T_{std})(v_s)(\theta)(A_n)(P_s)(60)(1 - B_{ws})}$$

$$I = \frac{(864.4)(181.38)(29.92)(100)}{(528)(40.111)(240)(0.000547)(30.233)(60)(1 - 0.0503)}$$

I = $\underline{97.9}$ %

MONTROSE AIR QUALITY SERVICES

EXAMPLE CALCULATIONS
DIOXINS/FURANS

Project name:	Ecolube	**Project number:**	021AS-011833
Computed by:	Avella	**Calculation date:**	2022-04-04
Run number:	1	**Gaseous Species:**	1234678-Cl7-Dioxin

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured PCDD in sample, pg/sample	78.8	m
Standard volume of gas sampled, dscf	181.347	V_{mstd}
Dry stack gas flow rate at standard conditions, dscfm	2,927	Q_{ds}

1 GASEOUS EMISSIONS

a. Concentration, ng/dscm

$$C = \frac{\sum m}{(V_{mstd})} \times \frac{1\ ng}{1000\ pg} \times \frac{35.315\ ft^3}{1\ m^3}$$

$$C = \frac{(78.8)(35.315)}{(181.347)(1000)}$$

C = 0.0153 ng/dscm

b. Mass emission rate, lb/hr

$$M = (C)(Q_{ds}) \times \left(\frac{1\ g}{10^9\ ng}\right)\left(\frac{1\ lb}{453.6\ g}\right)\left(\frac{1\ m^3}{35.315\ ft^3}\right)(60\ min/hr)$$

$$M = \frac{(0.0153)(2{,}927)(60)}{(10^{\wedge}9)(453.6)(35.315)}$$

M = 1.68E-10 lb/hr

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

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EXAMPLE CALCULATIONS
PAHs

Project name:	Ecolube	**Project number:**	021AS-011833
Computed by:	Avella	**Calculation date:**	2022-04-04
Run number:	1	**Gaseous Species:**	Pyrene

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured PAH in sample, ng/sample	3000	m
Standard volume of gas sampled, dscf	181.347	V_{mstd}
Dry stack gas flow rate at standard conditions, dscfm	2,927	Q_{ds}

1 GASEOUS EMISSIONS

a. Concentration, ng/dscm

$$C = \frac{\sum m}{(V_{mstd})} \times \frac{35.315\ ft^3}{1\ m^3}$$

$$C = \frac{(3000)(35.315)}{(181.347)}$$

C = 584.21 ng/dscm

b. Mass emission rate, lb/hr

$$M = (C)(Q_{ds}) \times \left(\frac{1\ g}{10^9\ ng}\right)\left(\frac{1\ lb}{453.6\ g}\right)\left(\frac{1\ m^3}{35.315\ ft^3}\right)(60\ min/hr)$$

$$M = \frac{(584.21148)(2,927)(60)}{(10^{\wedge}9)(453.6)(35.315)}$$

M = 6.40E-06 lb/hr

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

EXAMPLE CALCULATIONS
PAHs

Project name:	Ecolube	**Project number:**	021AS-011833
Computed by:	Avella	**Calculation date:**	2022-04-04
Run number:	1	**Gaseous Species:**	Perylene @ 1/2 DL

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured PAH in sample, ng/sample (1/2 of DL)	5.20	m
Standard volume of gas sampled, dscf	181.347	V_{mstd}
Dry stack gas flow rate at standard conditions, dscfm	2,927	Q_{ds}

1 GASEOUS EMISSIONS

a. Concentration, ng/dscm

Note: 1/2 of DL used when summing PAH congeners that were non-detect in order to determine the total PAH suite emissions.

$$C = \frac{\sum m}{(V_{mstd})} \times \frac{35.315\ ft^3}{1\ m^3}$$

$$C = \frac{(5.2)(35.315)}{(181.347)}$$

C = 1.01 ng/dscm

b. Mass emission rate, lb/hr

$$M = (C)(Q_{ds}) \times \left(\frac{1\ g}{10^9\ ng}\right)\left(\frac{1\ lb}{453.6\ g}\right)\left(\frac{1\ m^3}{35.315\ ft^3}\right)(60\ min/hr)$$

$$M = \frac{(1.01263)(2{,}927)(60)}{(10\text{^}9)(453.6)(35.315)}$$

M = 1.11E-08 lb/hr

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

EXAMPLE CALCULATIONS
PCBs

Project name:	Ecolube	**Project number:**	021AS-011833
Computed by:	Avella	**Calculation date:**	2022-04-04
Run number:	1	**Gaseous Species:**	PCB-18

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured PCB in sample, ng/sample	9.69	m
Standard volume of gas sampled, dscf	181.347	V_{mstd}
Dry stack gas flow rate at standard conditions, dscfm	2,927	Q_{ds}

1 GASEOUS EMISSIONS

a. Concentration, ng/dscm

$$C = \frac{\sum m}{(V_{mstd})} \times \frac{35.315\ ft^3}{1\ m^3}$$

$$C = \frac{(9.69)(35.315)}{(181.347)}$$

C = 1.89 ng/dscm

b. Mass emission rate, lb/hr

$$M = (C)(Q_{ds}) \times \left(\frac{1\ g}{10^9\ ng}\right)\left(\frac{1\ lb}{453.6\ g}\right)\left(\frac{1\ m^3}{35.315\ ft^3}\right)(60\ min/hr)$$

$$M = \frac{(1.887)(2{,}927)(60)}{(10^9)(453.6)(35.315)}$$

M = 2.07E-08 lb/hr

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

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EXAMPLE CALCULATIONS
Chlorobenzene/Chlorophenol

Project name:	Ecolube	**Project number:**	021AS-011833
Computed by:	Avella	**Calculation date:**	2022-04-04
Run number:	1	**Gaseous Species:**	2-Chlorophenol

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured compound in sample, ng/sample (at detection limit)	425	m
Standard volume of gas sampled, dscf	181.347	V_{mstd}
Dry stack gas flow rate at standard conditions, dscfm	2,927	Q_{ds}

1 GASEOUS EMISSIONS

a. Concentration, ng/dscm

$$C = \frac{\sum m}{(V_{mstd})} \times \frac{35.315\ ft^3}{1\ m^3}$$

$$C = \frac{(425)(35.315)}{(181.347)}$$

C = 82.8 ng/dscm

b. Mass emission rate, lb/hr

$$M = (C)(Q_{ds}) \times \left(\frac{1\ g}{10^9\ ng}\right)\left(\frac{1\ lb}{453.6\ g}\right)\left(\frac{1\ m^3}{35.315\ ft^3}\right)(60\ min/hr)$$

$$M = \frac{(82.8)(2{,}927)(60)}{(10^{\wedge}9)(453.6)(35.315)}$$

M = 9.08E-07 lb/hr

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

MONTROSE AIR QUALITY SERVICES

EXAMPLE CALCULATIONS
GASEOUS EMISSIONS

Project name:	Ecolube	**Project number:**	006AS-011833
Computed by:	A Vella	**Calculation date:**	2022-04-04
Run number:	RTO In R1	**Gaseous Species:**	VOC as propane

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Concentration of gaseous species, ppmvw	191	C_w
Dry stack gas flow rate at standard conditions, dscfm	2,589	Q_{ds}
Stack moisture, % volume	0.0118	B_{ws}
Molecular weight of gaseous species, lb/lb-mol	44.1	MW_S, where
MW_S =	44.1 for C_3H_8	
Conversion factor from ppm to lb/scf	1.14E-07	CF where

1.194E-07 [(lb/scf) / ppm] for NO_X

1.660E-07 [(lb/scf) / ppm] for SO_2

1.194E-07 x MW_x/MW_{NOX} [(lb/scf) / ppm] for other compounds (x)

1 GASEOUS EMISSIONS

a. Concentration, ppmvd

$$C = \frac{C_w}{(1 - B_{ws})}$$

$$C = \frac{191}{(1 - 0.0118)}$$

C = 193 ppmvd

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

b. **Mass emission rate, lb/hr**

$$M = (C)(CF)(Q_{ds})(60\ min/hr)$$

M = (193)(1.14E-07)(2,589)(60)

M = 3.43 lb/hr

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EXAMPLE CALCULATIONS
GASEOUS EMISSIONS

Project name:	Ecolube	**Project number:**	006AS-011833
Computed by:	A Vella	**Calculation date:**	2022-04-04
Run number:	RTO Out R1	**Gaseous Species:**	VOC as propane

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Concentration of gaseous species, ppmvw	12.81	C_w
Dry stack gas flow rate at standard conditions, dscfm	2,928	Q_{ds}
Stack moisture, % volume	0.0502	B_{ws}
Molecular weight of gaseous species, lb/lb-mol	44.1	MW_S, where
MW_S =	44.1 for C_3H_8	
Conversion factor from ppm to lb/scf	1.14E-07	*CF* where

1.194E-07 [(lb/scf) / ppm] for NO_X

1.660E-07 [(lb/scf) / ppm] for SO_2

1.194E-07 x MW_x/MW_{NOX} [(lb/scf) / ppm] for other compounds (x)

1 GASEOUS EMISSIONS

a. Concentration, ppmvd

$$C = \frac{C_w}{(1 - B_{ws})}$$

$$C = \frac{12.81}{(1 - 0.0502)}$$

C = 13.5 ppmvd

Note: The results calculated on these pages may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

b. Mass emission rate, lb/hr

$$M = (C)(CF)(Q_{ds})(60\ min/hr)$$

M = $(13.5)(1.14E\text{-}07)(2{,}928)(60)$

M = $\underline{0.271}$ lb/hr

MONTROSE AIR QUALITY SERVICES

EXAMPLE CALCULATIONS
REDUCTION EFFICIENCY

Project name:	Ecolube	**Project number:**	006AS-011833
Computed by:	A Vella	**Calculation date:**	2022-04-04
Run number:	1	**Gaseous Species:**	VOC

EMISSIONS DATA

Inlet rate, lb/hr	3.43	M_{in}
Outlet rate, lb/hr	0.271	M_{out}

1 REDUCTION EFFICIENCY

a. Efficiency, %

$$RE = \frac{(M_{in} - M_{out})}{M_{in}} \times 100\%$$

$$RE = \frac{(3.43 - 0.271)}{3.43} \times 100\%$$

RE = 92.1 % reduction

Note: The results calculated on this page may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

Appendix A.8
General Equations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

   a. Standard sample gas volume, dscf

$$V_{m\,std} = (V_m)(Y)\frac{(T_{std} + 460)\left(P_{bar} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)(P_{std})}$$

   b. Water vapor volume, scf

$$V_{w\,std} = (0.04715)(V_{lc})\left(\frac{T_{std} + 460}{528}\right)$$

   c. Moisture content, non-dimensional

$$B_{ws} = \frac{V_{w\,std}}{(V_{m\,std} + V_{w\,std})}$$

   d. Stack gas molecular weight, lb/lb mole (dry)

$$MW_{dry} = [0.44(\%CO_2)] + [0.32(\%O_2)] + [0.28(\%N_2)]$$

   e. Stack gas molecular weight, lb/lb mole (wet)

$$MW_{wet} = \left[MW_{dry}(1 - B_{ws})\right] + [18(B_{ws})]$$

   f. Absolute stack pressure, in Hg

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

   g. Stack velocity, ft/sec

$$v_s = (85.49)(C_p)(\sqrt{\Delta P})\sqrt{\frac{T_s}{(P_s)(MW_{wet})}}$$

   h. Actual stack flow rate, acfm

$$Q = (v_s)(A_s)(60\,min/hr)$$

   i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (v_s)(A_s)(60\,min/hr)\left(\frac{T_{std} + 460}{T_s + 460}\right)\left(\frac{P_s}{P_{std}}\right)$$

   j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (v_s)(A_s)(60\,min/hr)(1 - B_{ws})\left(\frac{T_{std} + 460}{T_s + 460}\right)\left(\frac{P_s}{P_{std}}\right)$$

   k. Percent isokinetic

$$I = \frac{(T_s)(V_{m\,std})(P_{std})(100)}{(T_{std} + 460)(v_s)(\theta)(A_n)(P_s)(60)(1 - B_{ws})}$$

2. Gaseous Emissions

a. Concentration, ppm volume wet (i.e. to calculate wet ppm from dry ppm)

$$C_w = (C)(1 - B_{ws})$$

b. Concentration, ppm @ 3% O_2 dry

$$C_3 = (C)\left[\frac{(20.9 - 3.0)}{(20.9 - \%\ O_2)}\right]$$

c. Concentration, ppm @ 12% CO_2 dry

$$C_{12} = (C)\left(\frac{12.0}{\%\ CO_2}\right)$$

d. Concentration, ppm volume dry (i.e. to calculate dry ppm from wet ppm)

$$C = \left[\frac{C_w}{(1 - B_{ws})}\right]$$

e. Mass emission rate, lb/hr

$$M = (C)(CF)(Q_{ds})(60\ min/hr)$$

where,

CF = conversion factor from ppm to lb/scf:

$$CF_{NOx} = 1.194 \times 10^{-7}\left(\frac{lb/scf}{ppm}\right)$$

$$CF_{SO2} = 1.660 \times 10^{-7}\left(\frac{lb/scf}{ppm}\right)$$

$CF_X = CF_{NOX}\left(\frac{MW_X}{MW_{NOX}}\right)$ for other compounds (x)

f. Emission rate, lb/MMBtu

$$E = (C)(CF)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

g. Mass emission rate, grams/bhp-hr

$$M_j = (M)\left(\frac{453.59\ g/lb}{J}\right)$$

3. Particulate Emissions

a. Grain loading, gr/dscf

$$G = (0.0154)\left(\frac{G_m}{V_{m\,std}}\right)$$

b. Grain loading corrected to 12% CO_2, gr/dscf @ 12% CO_2

$$G_{12} = (G)\left(\frac{12.0}{\%\ CO_2}\right)$$

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7{,}000\ gr/lb}\right)$$

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7{,}000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

4. Fuel Factor "F"

a. Choice #1 – use the values for F_d provided in Method 19, Table 19-1
Choice #2 – if you have fuel ultimate and proximate analysis, calculate F_d (need fuel weight %CHONS, HHV)
Stoichiometric fuel factor at 68 °F, dscf/MMBtu at 0% O_2:

$$F_d = \frac{(10^6)[3.64(\%\ H) + 1.53(\%\ C) + 0.14(\%\ N) + 0.57(\%\ S) - 0.46(\%\ O)]}{HHV, Btu/lb}$$

b. Fuel factor at 60 °F (use if all your volumes and flows are at 60 °F)

$$F_{d\,60} = F_d\left(\frac{520°R}{528°R}\right)$$

5. Miscellaneous Equations

a. Standard stack gas flow rate, calculated from fuel flow and F factor, dscfm

Note: Q_f and HHV need to be in units of either lb/hr and Btu/lb, or scf/hr and Btu/scf. *Do not mix units!*

(calculation based on stack $\%O_2$)

$$Q_{ds} = \left(Q_f\right)(HHV)(10^{-6})(F_d)\left(\frac{20.9}{20.9 - \%\,O_2}\right)/(60\,min/hr)$$

or (calculation based on stack $\%CO_2$ – see EPA Method 19 for values of F_c)

$$Q_{ds} = \left(Q_f\right)(HHV)(10^{-6})(F_c)\left(\frac{100}{\%\,CO_2}\right)/(60\,min/hr)$$

b. Destruction efficiency of emission control device, %

$EFF = \left(\frac{C_{in} - C_{out}}{C_{in}}\right)(100\%)$ based on concentrations

or

$EFF = \left(\frac{M_{in} - M_{out}}{M_{in}}\right)(100\%)$ based on mass emission rates

c. Cylinder gas audit, % accuracy

$$A_c = \left(\frac{C_m - C_a}{C_a}\right)(100\%)$$

Nomenclature:

A_c	=	accuracy of CEMS during cylinder gas audit (CGA), % difference
A_n	=	nozzle area, in^2 (π r^2), where π = 3.1416 and r = radius (½ diameter) in inches
A_s	=	stack area, ft^2 (π r^2), where π = 3.1416 and r = radius (½ diameter) in feet
B_{ws}	=	flue gas moisture content (multiply by 100 for % by volume)
C	=	concentration of gaseous species, ppm volume dry
C_a	=	concentration of audit gas, ppm (for CGA, equation 5c)
C_m	=	concentration measured by CEMS, ppm (for CGA, equation 5c)
C_p	=	calibration factor for pitot tube, dimensionless
C_w	=	concentration of gaseous species, ppm volume wet
C_3	=	corrected concentration of gaseous species, ppm @ 3% O_2 dry
C_{12}	=	corrected concentration of gaseous species, ppm @ 12% CO_2 dry
E	=	mass emission rate, lb/MMBtu
EFF	=	destruction or removal efficiency of emission control device, % efficiency
F_c	=	stoichiometric “F” factor of fuel based on CO_2, dscf/MMBtu @ 100% CO_2
F_d	=	stoichiometric “F” factor of fuel based on O_2, dscf/MMBtu @ 0% O_2
G	=	particulate matter grain loading, grains/dscf
G_{12}	=	corrected particulate matter grain loading, grains/dscf @ 12% CO_2
G_m	=	mass of collected particulate matter, mg
HHV	=	higher heating value, Btu/cubic foot
I	=	% isokinetic sampling rate, %
J	=	brake horsepower, bhp
M_j	=	mass emission rate of measured species (s), g/hp-hr
M	=	mass emission rate, lb/hr
MW_{dry}	=	molecular weight of stack gas, dry basis
MW_{wet}	=	molecular weight of stack gas, wet basis
MW_s	=	molecular weight of gaseous species (s), lb/lb mole:

CO:	28.01	(can use 28)	NO_x as NO_2:	46.01	(can use 46)
SO_x as SO_2:	64.06	(can use 64)	Hydrocarbons as C:	12.01	(can use 12)
Hydrocarbons as CH_4:	16.04	(can use 16)	Hydrocarbons as C_3H_8:	44.10	(can use 44)
NH_3:	17.03	(can use 17)			

N_2	=	nitrogen content of stack gas, % volume dry
P_{bar}	=	barometric pressure, in. Hg
P_s	=	stack absolute pressure, in. Hg
P_{sg}	=	stack static pressure, inches of water, gauge (iwg)
Q	=	wet stack gas flow rate at actual conditions, acfm
Q_f	=	fuel flow rate, scfh or lb/hr (be careful of units)
Q_{ds}	=	dry stack gas flow rate at standard conditions, dscfm
Q_{ws}	=	wet stack gas flow rate at standard conditions, wscfm
SV	=	specific molar volume of an ideal gas at standard conditions, ft^3/lb mole
T_m	=	meter temperature, °R
T_{std}	=	reference temperature, °R
T_s	=	stack gas temperature, °R
v_s	=	stack gas velocity, ft/sec
V_{lc}	=	volume of liquid collected in impingers, ml
V_m	=	dry meter volume uncorrected, acf
$V_{m\ std}$	=	dry meter volume corrected to standard conditions, dscf
$V_{w\ std}$	=	volume of water vapor at standard conditions, scf
Y	=	meter calibration coefficient, dimensionless
ΔH	=	average pressure differential across meter, inches water
ΔP	=	average velocity head of stack gas, inches water
Θ	=	sampling time, minutes

APPENDIX B
FACILITY PROCESS DATA

Run	Date	Time Start	Time End	Process	Parameter	Value	Units	NOTES
1	1/26/2022	1410	1827	Refinery	Flash Tank Feed	14	GPM	
					WFE-1 Feed	12.8	GPM	
					WFE-1 Vacuum	2	torr	
				Sulfonation	Sulfur Flow	30	lb/hr	*Pump was run in manual, flow meter broken. Rate estimated based off of gear pump capacity*
					Oil Flow	6	GPM	*Flow meter was off, showing 8GPM in field.*
					Air Flow	543	SCFM	
				OPS	Train 1 Feed	4	GPM	*manual reading*
					Train 2 Feed	4	GPM	*manual reading*
					React. Vacuum	500	torr	
				RTO	Inlet Pressure	-3	in. W.C.	
					Avg. Temp.	1538	°F	
					Exhaust Temp.	500	°F	
				Utility	Natural Gas	15.4	CCF	
					Fuel Burned	173	US Gal	*TOTAL*
2	1/27/2022	927	1339	Refinery	Flash Tank Feed	14	GPM	
					WFE-1 Feed	12.7	GPM	
					WFE-1 Vacuum	2.8	torr	
				Sulfonation	Sulfur Flow	30	lb/hr	*Pump was run in manual, flow meter broken. Rate estimated based off of gear pump capacity*
					Oil Flow	6	GPM	*Flow meter was off, showing 8GPM in field.*
					Air Flow	540	SCFM	
				OPS	Train 1 Feed	4	GPM	*manual reading*
					Train 2 Feed	4	GPM	*manual reading*
					React. Vacuum	578	torr	
				RTO	Inlet Pressure	-3	in. W.C.	
					Avg. Temp.	1553	°F	
					Exhaust Temp.	498	°F	
				Utility	Natural Gas	14.6	CCF	
					Fuel Burned	167	US Gal	*TOTAL*
3	1/27/2022	1441	1905	Refinery	Flash Tank Feed	14	GPM	
					WFE-1 Feed	12.8	GPM	
					WFE-1 Vacuum	2.1	torr	
				Sulfonation	Sulfur Flow	30	lb/hr	*Pump was run in manual, flow meter broken. Rate estimated based off of gear pump capacity*
					Oil Flow	6	GPM	*Flow meter was off, showing 8GPM in field.*
					Air Flow	530	SCFM	
				OPS	Train 1 Feed	4	GPM	*manual reading*
					Train 2 Feed	4	GPM	*manual reading*
					React. Vacuum	500	torr	
				RTO	Inlet Pressure	-3.0	in. W.C.	
					Avg. Temp.	1542	°F	
					Exhaust Temp.	501	°F	
				Utility	Natural Gas	19	CCF	
					Fuel Burned	165	US Gal	*TOTAL*

Fuel Composition – provided by Ecolube

Sulfur: 0.233%

PCBs: Non Detect

Arsenic: less than 1 ppm

Cadmium: less than 0.1 ppm

Chromium: less than 4 ppm

Lead: less than 1 ppm

Halogens: 448 ppm

Flashpoint: 65°F

APPENDIX C
LABORATORY ANALYSIS DATA

Appendix C.1
PCDD, PCDF, PCB & PAH Analyses

Montrose Air Quality Services, LLC - Portland

13585 NE Whitaker Way
Portland, OR 97230

Ecolube

RTO #1 Outlet
Client Project # 006AS-011833
Samples Received: 02/01/22 and 02/02/22

Analytical Report
1221-831

Modified CARB 429/ Revised M23
PAHs and PCDD/PCDFs

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I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 28 pages.

Laura Boivin

QA Review Performed by: Laura K. Boivin

Report Issued Date: 3/25/2022

ENTHALPY ANALYTICAL

Summary of Results

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Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Summary

	Compound	CAS	Run 1 pg	Run 2 pg	Run 3 pg	Run FPB pg
TCDD	Air	1746-01-6	ND U	ND U	ND U	ND U
PeCDD	12378-PeCDD (S)	40321-76-4	ND U	ND U	ND U	ND U
HxCDD	123478-HxCDD (S)	39227-28-6	ND U	ND U	ND U	ND U
	123678-HxCDD (S)	57653-85-7	ND U	ND U	ND U	ND U
	123789-HxCDD (S)	19408-74-3	ND U	ND U	ND U	ND U
HpCDD	1234678-HpCDD (S)	35822-46-9	78.8	62.6	76.3	ND U
OCDD	OCDD (S)	3268-87-9	167	159	191	ND U
TCDF	2378-TCDF (S)	51207-31-9	72.4	29.4	ND U	ND U
PeCDF	12378-PeCDF (S)	57117-41-6	ND U	ND U	ND U	ND U
	23478-PeCDF (S)	57117-31-4	ND U	ND U	ND U	ND U
HxCDF	123478-HxCDF (S)	70648-26-9	ND U	ND U	ND U	ND U
	123678-HxCDF (S)	57117-44-9	ND U	ND U	ND U	ND U
	234678-HxCDF (S)	60851-34-5	ND U	ND U	ND U	ND U
	123789-HxCDF (S)	72918-21-9	ND U	ND U	ND U	ND U
HpCDF	1234678-HpCDF (S)	67562-39-4	ND U	ND U	ND U	ND U
	1234789-HpCDF (S)	55673-89-7	ND U	ND U	ND U	ND U
OCDF	OCDF (S)	39001-02-0	ND U	ND U	ND U	ND U

TCDD group total	41903-57-5	202	18.1	9.68	ND
PeCDD group total	36088-22-9	77.7	11.0	ND	ND
HxCDD group total	34465-46-8	75.1	43.7	34.6	ND
HpCDD group total	37871-00-4	146	109	141	ND
OCDD group total		167	159	191	ND
TCDF group total	55722-27-5	164	58.1	ND	ND
PeCDF group total	30402-15-4	ND	ND	ND	ND
HxCDF group total	55684-94-1	ND	ND	ND	ND
HpCDF group total	38998-75-3	ND	ND	ND	ND
OCDF group total		ND	ND	ND	ND

TEQ	ITEQ (ND=0; EMPC=0)	8.19	3.72	0.955	0
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)	14.4	9.46	7.40	3.81
	ITEQ (ND=EDL EMPC=EDL)	20.7	15.2	13.8	7.61
	ITEQ (ND=0; EMPC=EMPC)	8.19	3.72	0.955	0
	ITEQ (ND=1/2EDL; EMPC=EMPC)	14.4	9.46	7.40	3.81
	ITEQ (ND=EDL; EMPC=EMPC)	20.7	15.2	13.8	7.61
	WTEQ (ND=0; EMPC=0)	8.07	3.61	0.821	0
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)	15.2	10.6	8.43	4.29
	WTEQ (ND=EDL EMPC=EDL)	22.3	17.5	16.0	8.57
	WTEQ (ND=0; EMPC=EMPC)	8.07	3.61	0.821	0
	WTEQ (ND=1/2EDL; EMPC=EMPC)	15.2	10.6	8.43	4.29
	WTEQ (ND=EDL; EMPC=EMPC)	22.3	17.5	16.0	8.57

Summary of Results: Totals

EU Job#: **1221-831**

Client Project ID: **006AS-011833**

PAH (SOP EU052)

Analyte	Method Blank 1 ng	Run 1 ng	Run 2 ng	Run 3 ng	Run FPB ng
Totals					
Naphthalene	2050	106000	162000	130000	9720
2-Methyl-naphthalene	297	102000	107000	94800	1920
Acenaphthylene	0.841	2710	2190	2610	ND
Acenaphthene	0.985	1100	849	1090	ND
Fluorene	14.3	5390	3210	4100	37.9
Phenanthrene	10.9	15900	9400	11500	110
Anthracene	ND	2220	ND	1860	10.8
Fluoranthene	22.9	4050	1920	3390	44.2
Pyrene	75.9	3000	884	2350	87.6
Benzo(a)Anthracene	1.07	968	314	857	13.5
Chrysene	1.46	1210	816	1170	15.2
Benzo(b)Fluoranthene	2.84	415	230	420	21.7
Benzo(k)Fluoranthene	0.893	84.4	54.0	69.5	8.96
Benzo(e)Pyrene	3.20	105	45.9	110	12.7
Benzo(a)Pyrene	3.25	25.2	ND	ND	9.41
Perylene	0.846	ND	ND	ND	ND
Indeno(123-cd)Pyrene	1.96	ND	ND	ND	ND
Benzo(ghi)Perylene	9.22	33.1	43.1	67.9	34.0
Dibenzo(a,h)Anthracene	0.208	ND	ND	ND	ND

Detailed Results

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ANALYTICAL

Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Enthalpy ID	1221-831-001-1	Prep Batch	EU13049	Sample Vol (mL)	N/A
Sample Name	Run 1	Prep Date	2022-02-22 13:40	Extract Vol (mL)	0.02
Matrix	Air	Analysis Date	2022-03-02 14:19	Split Factor	2
Sampling Date	20220126 00:00	Analyst	bahager / hallen	Method Code	WM-001
Received Date	2022-02-01 11:30	Instrument	Galadriel	Sample Type	Sample

	Compound	CAS	Extract Concentration pg/uL	Sample Concentration pg	Formatted Result pg	LOQ pg	DL pg	EDL pg	Recovery Limits	Recovery	Flags
TCDD	2378-TCDD (S)	1746-01-6	ND	ND	ND	5.00	3.46	3.88			U
PeCDD	12378-PeCDD (S)	40321-76-4	ND	ND	ND	25.0	2.35	5.67			U
HxCDD	123478-HxCDD (S)	39227-28-6	ND	ND	ND	25.0	4.97	5.57			U
	123678-HxCDD (S)	57653-85-7	ND	ND	ND	25.0	4.62	5.81			U
	123789-HxCDD (S)	19408-74-3	ND	ND	ND	25.0	5.78	5.35			U
HpCDD	1234678-HpCDD (S)	35822-46-9	1.97	78.8	78.8	25.0	6.85	5.53			
OCDD	OCDD (S)	3268-87-9	4.18	167	167	50.0	6.82	9.88			
TCDF	2378-TCDF (S)	51207-31-9	1.81	72.4	72.4	5.00	1.47	3.77			
PeCDF	12378-PeCDF (S)	57117-41-6	ND	ND	ND	25.0	3.24	4.93			U
	23478-PeCDF (S)	57117-31-4	ND	ND	ND	25.0	2.53	5.00			U
HxCDF	123478-HxCDF (S)	70648-26-9	ND	ND	ND	25.0	3.55	3.13			U
	123678-HxCDF (S)	57117-44-9	ND	ND	ND	25.0	3.24	3.10			U
	234678-HxCDF (S)	60851-34-5	ND	ND	ND	25.0	3.87	2.99			U
	123789-HxCDF (S)	72918-21-9	ND	ND	ND	25.0	3.12	3.53			U
HpCDF	1234678-HpCDF (S)	67562-39-4	ND	ND	ND	25.0	2.68	2.67			U
	1234789-HpCDF (S)	55673-89-7	ND	ND	ND	25.0	1.99	2.87			U
OCDF	OCDF (S)	39001-02-0	ND	ND	ND	50.0	11.7	7.11			U
ES	13C-2378-TCDD (ES)	76523-40-5	78.62	3145				14.6	40-135%	78.6%	
	13C-12378-PeCDD (ES)	109719-79-1	73.20	2928				16.2	40-135%	73.2%	
	13C-123478-HxCDD (ES)	109719-80-4	71.94	2878				19.3	40-135%	71.9%	
	13C-123678-HxCDD (ES)	109719-81-5	80.59	3224				20.4	40-135%	80.6%	
	13C-123789-HxCDD (ES)	109719-82-6	79.73	3189				17.8	40-135%	79.7%	
	13C-1234678-HpCDD (ES)	109719-83-7	75.11	3004				16.8	40-135%	75.1%	
	13C-OCDD (ES)	114423-97-1	119.57	4783				12.1	40-135%	59.8%	
	13C-2378-TCDF (ES)	89059-46-1	84.61	3384				18.6	40-135%	84.6%	
	13C-12378-PeCDF (ES)	109719-77-9	74.32	2973				17.2	40-135%	74.3%	
	13C-23478-PeCDF (ES)	116843-02-8	78.07	3123				17.5	40-135%	78.1%	
	13C-123478-HxCDF (ES)	114423-98-2	83.38	3335				30.8	40-135%	83.4%	
	13C-123678-HxCDF (ES)	116843-03-9	81.05	3242				27.4	40-135%	81.0%	
	13C-234678-HxCDF (ES)	116843-05-1	84.42	3377				27.9	40-135%	84.4%	
	13C-123789-HxCDF (ES)	116843-04-0	85.80	3432				29.1	40-135%	85.8%	
	13C-1234678-HpCDF (ES)	109719-84-8	81.56	3262				24.2	40-135%	81.6%	
	13C-1234789-HpCDF (ES)	109719-94-0	83.67	3347				26.2	40-135%	83.7%	
	13C-OCDF (ES)	109719-78-0	125.63	5025				13.3	40-135%	62.8%	
SS	37Cl-2378-TCDD (SS)		46.90	1876				2.72	70-130%	117.2%	
	13C-12347-PeCDD (SS)		95.25	3810				19.9	70-130%	95.2%	
	13C-12346-PeCDF (SS)		101.56	4063				21.8	70-130%	101.6%	
	13C-123469-HxCDF (SS)		94.71	3788				34.2	70-130%	94.7%	
	13C-1234689-HpCDF (SS)		93.73	3749				30.0	70-130%	93.7%	
AS	13C-1368-TCDD (AS)		77.06	3083				13.6	20-150%	77.1%	
	13C-1368-TCDF (AS)		79.66	3186				16.4	20-150%	79.7%	

TCDD group total:		41903-57-5	5.04	202				3.88			
PeCDD group total:		36088-22-9	1.94	77.7				5.67			
HxCDD group total:		34465-46-8	1.88	75.1				5.58			
HpCDD group total:		37871-00-4	3.65	146				5.53			
OCDD group total:			4.18	167				9.88			
TCDF group total:		55722-27-5	4.09	164				3.77			
PeCDF group total:		30402-15-4	ND	ND				4.96			
HxCDF group total:		55684-94-1	ND	ND				3.19			
HpCDF group total:		38998-75-3	ND	ND				2.77			
OCDF group total:			ND	ND				7.11			

TEQ	ITEQ (ND=0; EMPC=0)			8.19
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)			14.4
	ITEQ (ND=EDL EMPC=EDL)			20.7
	ITEQ (ND=0; EMPC=EMPC)			8.19
	ITEQ (ND=1/2EDL; EMPC=EMPC)			14.4
	ITEQ (ND=EDL; EMPC=EMPC)			20.7
	WTEQ (ND=0; EMPC=0)			8.07
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)			15.2
	WTEQ (ND=EDL EMPC=EDL)			22.3
	WTEQ (ND=0; EMPC=EMPC)			8.07
	WTEQ (ND=1/2EDL; EMPC=EMPC)			15.2
	WTEQ (ND=EDL; EMPC=EMPC)			22.3

Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Enthalpy ID	1221-831-002-1	Prep Batch	EU13049	Sample Vol (mL)	N/A
Sample Name	Run 2	Prep Date	2022-02-22 13:40	Extract Vol (mL)	0.02
Matrix	Air	Analysis Date	2022-03-01 12:06	Split Factor	2
Sampling Date	20220127 00:00	Analyst	bahager / hallen	Method Code	WM-001
Received Date	2022-02-01 11:30	Instrument	Galadriel	Sample Type	Sample

	Compound	CAS	Extract Concentration pg/uL	Sample Concentration pg	Formatted Result pg	LOQ pg	DL pg	EDL pg	Recovery Limits	Recovery	Flags
TCDD	2378-TCDD (S)	1746-01-6	ND	ND	ND	5.00	3.46	3.92			U
PeCDD	12378-PeCDD (S)	40321-76-4	ND	ND	ND	25.0	2.35	6.35			U
HxCDD	123478-HxCDD (S)	39227-28-6	ND	ND	ND	25.0	4.97	4.40			U
	123678-HxCDD (S)	57653-85-7	ND	ND	ND	25.0	4.62	4.37			U
	123789-HxCDD (S)	19408-74-3	ND	ND	ND	25.0	5.78	4.06			U
HpCDD	1234678-HpCDD (S)	35822-46-9	1.56	62.6	62.6	25.0	6.85	5.17			
OCDD	OCDD (S)	3268-87-9	3.97	159	159	50.0	6.82	7.38			
TCDF	2378-TCDF (S)	51207-31-9	0.73	29.4	29.4	5.00	1.47	2.88			
PeCDF	12378-PeCDF (S)	57117-41-6	ND	ND	ND	25.0	3.24	3.40			U
	23478-PeCDF (S)	57117-31-4	ND	ND	ND	25.0	2.53	3.44			U
HxCDF	123478-HxCDF (S)	70648-26-9	ND	ND	ND	25.0	3.55	2.87			U
	123678-HxCDF (S)	57117-44-9	ND	ND	ND	25.0	3.24	2.77			U
	234678-HxCDF (S)	60851-34-5	ND	ND	ND	25.0	3.87	2.61			U
	123789-HxCDF (S)	72918-21-9	ND	ND	ND	25.0	3.12	3.15			U
HpCDF	1234678-HpCDF (S)	67562-39-4	ND	ND	ND	25.0	2.68	3.00			U
	1234789-HpCDF (S)	55673-89-7	ND	ND	ND	25.0	1.99	3.54			U
OCDF	OCDF (S)	39001-02-0	ND	ND	ND	50.0	11.7	4.89			U
ES	13C-2378-TCDD (ES)	76523-40-5	83.84	3354				11.3	40-135%	83.8%	
	13C-12378-PeCDD (ES)	109719-79-1	83.57	3343				11.5	40-135%	83.6%	
	13C-123478-HxCDD (ES)	109719-80-4	67.17	2687				13.1	40-135%	67.2%	
	13C-123678-HxCDD (ES)	109719-81-5	81.14	3246				13.9	40-135%	81.1%	
	13C-123789-HxCDD (ES)	109719-82-6	82.08	3283				12.1	40-135%	82.1%	
	13C-1234678-HpCDD (ES)	109719-83-7	77.54	3102				14.3	40-135%	77.5%	
	13C-OCDD (ES)	114423-97-1	132.52	5301				14.3	40-135%	66.3%	
	13C-2378-TCDF (ES)	89059-46-1	89.46	3579				20.4	40-135%	89.5%	
	13C-12378-PeCDF (ES)	109719-77-9	81.22	3249				13.4	40-135%	81.2%	
	13C-23478-PeCDF (ES)	116843-02-8	80.98	3239				13.6	40-135%	81.0%	
	13C-123478-HxCDF (ES)	114423-98-2	83.88	3355				24.5	40-135%	83.9%	
	13C-123678-HxCDF (ES)	116843-03-9	83.75	3350				21.8	40-135%	83.7%	
	13C-234678-HxCDF (ES)	116843-05-1	85.76	3430				22.2	40-135%	85.8%	
	13C-123789-HxCDF (ES)	116843-04-0	86.67	3467				23.1	40-135%	86.7%	
	13C-1234678-HpCDF (ES)	109719-84-8	80.03	3201				16.4	40-135%	80.0%	
	13C-1234789-HpCDF (ES)	109719-94-0	83.86	3354				17.9	40-135%	83.9%	
	13C-OCDF (ES)	109719-78-0	135.02	5401				10.7	40-135%	67.5%	
SS	37Cl-2378-TCDD (SS)		48.04	1922				2.24	70-130%	120.1%	
	13C-12347-PeCDD (SS)		95.97	3839				12.2	70-130%	96.0%	
	13C-12346-PeCDF (SS)		94.22	3769				15.5	70-130%	94.2%	
	13C-123469-HxCDF (SS)		92.32	3693				26.7	70-130%	92.3%	
	13C-1234689-HpCDF (SS)		101.32	4053				18.9	70-130%	101.3%	
AS	13C-1368-TCDD (AS)		83.77	3351				10.5	20-150%	83.8%	
	13C-1368-TCDF (AS)		82.10	3284				18.0	20-150%	82.1%	

TCDD group total:		41903-57-5	0.45	18.1				3.92			
PeCDD group total:		36088-22-9	0.28	11.0				6.35			
HxCDD group total:		34465-46-8	1.09	43.7				4.27			
HpCDD group total:		37871-00-4	2.73	109				5.17			
OCDD group total:			3.97	159				7.38			
TCDF group total:		55722-27-5	1.45	58.1				2.88			
PeCDF group total:		30402-15-4	ND	ND				3.42			
HxCDF group total:		55684-94-1	ND	ND				2.85			
HpCDF group total:		38998-75-3	ND	ND				3.27			
OCDF group total:			ND	ND				4.89			

TEQ	ITEQ (ND=0; EMPC=0)		3.72
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)		9.46
	ITEQ (ND=EDL EMPC=EDL)		15.2
	ITEQ (ND=0; EMPC=EMPC)		3.72
	ITEQ (ND=1/2EDL; EMPC=EMPC)		9.46
	ITEQ (ND=EDL; EMPC=EMPC)		15.2
	WTEQ (ND=0; EMPC=0)		3.61
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)		10.6
	WTEQ (ND=EDL EMPC=EDL)		17.5
	WTEQ (ND=0; EMPC=EMPC)		3.61
	WTEQ (ND=1/2EDL; EMPC=EMPC)		10.6
	WTEQ (ND=EDL; EMPC=EMPC)		17.5

Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Enthalpy ID	1221-831-003-1	Prep Batch	EU13049	Sample Vol (mL)	N/A
Sample Name	Run 3	Prep Date	2022-02-22 13:40	Extract Vol (mL)	0.02
Matrix	Air	Analysis Date	2022-03-01 12:57	Split Factor	2
Sampling Date	20220127 00:00	Analyst	bahager / hallen	Method Code	WM-001
Received Date	2022-02-01 11:30	Instrument	Galadriel	Sample Type	Sample

	Compound	CAS	Extract Concentration pg/uL	Sample Concentration pg	Formatted Result pg	LOQ pg	DL pg	EDL pg	Recovery Limits	Recovery	Flags
TCDD	2378-TCDD (S)	1746-01-6	ND	ND	ND	5.00	3.46	4.30			U
PeCDD	12378-PeCDD (S)	40321-76-4	ND	ND	ND	25.0	2.35	6.46			U
HxCDD	123478-HxCDD (S)	39227-28-6	ND	ND	ND	25.0	4.97	5.01			U
	123678-HxCDD (S)	57653-85-7	ND	ND	ND	25.0	4.62	5.06			U
	123789-HxCDD (S)	19408-74-3	ND	ND	ND	25.0	5.78	5.26			U
HpCDD	1234678-HpCDD (S)	35822-46-9	1.91	76.3	76.3	25.0	6.85	4.19			
OCDD	OCDD (S)	3268-87-9	4.79	191	191	50.0	6.82	9.15			
TCDF	2378-TCDF (S)	51207-31-9	ND	ND	ND	5.00	1.47	3.43			U
PeCDF	12378-PeCDF (S)	57117-41-6	ND	ND	ND	25.0	3.24	3.92			U
	23478-PeCDF (S)	57117-31-4	ND	ND	ND	25.0	2.53	4.04			U
HxCDF	123478-HxCDF (S)	70648-26-9	ND	ND	ND	25.0	3.55	2.90			U
	123678-HxCDF (S)	57117-44-9	ND	ND	ND	25.0	3.24	2.84			U
	234678-HxCDF (S)	60851-34-5	ND	ND	ND	25.0	3.87	2.80			U
	123789-HxCDF (S)	72918-21-9	ND	ND	ND	25.0	3.12	3.14			U
HpCDF	1234678-HpCDF (S)	67562-39-4	ND	ND	ND	25.0	2.68	3.87			U
	1234789-HpCDF (S)	55673-89-7	ND	ND	ND	25.0	1.99	5.10			U
OCDF	OCDF (S)	39001-02-0	ND	ND	ND	50.0	11.7	5.69			U
ES	13C-2378-TCDD (ES)	76523-40-5	73.20	2928				11.3	40-135%	73.2%	
	13C-12378-PeCDD (ES)	109719-79-1	73.41	2936				12.1	40-135%	73.4%	
	13C-123478-HxCDD (ES)	109719-80-4	66.01	2641				16.6	40-135%	66.0%	
	13C-123678-HxCDD (ES)	109719-81-5	74.15	2966				17.5	40-135%	74.2%	
	13C-123789-HxCDD (ES)	109719-82-6	73.82	2953				15.3	40-135%	73.8%	
	13C-1234678-HpCDD (ES)	109719-83-7	69.62	2785				20.4	40-135%	69.6%	
	13C-OCDD (ES)	114423-97-1	117.01	4680				18.2	40-135%	58.5%	
	13C-2378-TCDF (ES)	89059-46-1	77.15	3086				22.1	40-135%	77.2%	
	13C-12378-PeCDF (ES)	109719-77-9	70.96	2838				15.4	40-135%	71.0%	
	13C-23478-PeCDF (ES)	116843-02-8	71.89	2876				15.6	40-135%	71.9%	
	13C-123478-HxCDF (ES)	114423-98-2	79.07	3163				24.5	40-135%	79.1%	
	13C-123678-HxCDF (ES)	116843-03-9	77.95	3118				21.8	40-135%	77.9%	
	13C-234678-HxCDF (ES)	116843-05-1	76.66	3067				22.2	40-135%	76.7%	
	13C-123789-HxCDF (ES)	116843-04-0	79.83	3193				23.1	40-135%	79.8%	
	13C-1234678-HpCDF (ES)	109719-84-8	75.38	3015				24.6	40-135%	75.4%	
	13C-1234789-HpCDF (ES)	109719-94-0	72.36	2895				26.8	40-135%	72.4%	
	13C-OCDF (ES)	109719-78-0	122.19	4888				8.19	40-135%	61.1%	
SS	37Cl-2378-TCDD (SS)		49.04	1962				2.56	70-130%	122.6%	
	13C-12347-PeCDD (SS)		95.33	3813				15.4	70-130%	95.3%	
	13C-12346-PeCDF (SS)		96.78	3871				20.9	70-130%	96.8%	
	13C-123469-HxCDF (SS)		93.91	3756				28.7	70-130%	93.9%	
	13C-1234689-HpCDF (SS)		96.39	3856				29.3	70-130%	96.4%	
AS	13C-1368-TCDD (AS)		79.73	3189				10.5	20-150%	79.7%	
	13C-1368-TCDF (AS)		77.83	3113				19.5	20-150%	77.8%	

TCDD group total:		41903-57-5	0.24	9.68				4.30			
PeCDD group total:		36088-22-9	ND	ND				6.46			
HxCDD group total:		34465-46-8	0.87	34.6				5.11			
HpCDD group total:		37871-00-4	3.52	141				4.19			
OCDD group total:			4.79	191				9.15			
TCDF group total:		55722-27-5	ND	ND				3.43			
PeCDF group total:		30402-15-4	ND	ND				3.98			
HxCDF group total:		55684-94-1	ND	ND				2.92			
HpCDF group total:		38998-75-3	ND	ND				4.48			
OCDF group total:			ND	ND				5.69			

TEQ	ITEQ (ND=0; EMPC=0)			0.955
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)			7.40
	ITEQ (ND=EDL EMPC=EDL)			13.8
	ITEQ (ND=0; EMPC=EMPC)			0.955
	ITEQ (ND=1/2EDL; EMPC=EMPC)			7.40
	ITEQ (ND=EDL; EMPC=EMPC)			13.8
	WTEQ (ND=0; EMPC=0)			0.821
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)			8.43
	WTEQ (ND=EDL EMPC=EDL)			16.0
	WTEQ (ND=0; EMPC=EMPC)			0.821
	WTEQ (ND=1/2EDL; EMPC=EMPC)			8.43
	WTEQ (ND=EDL; EMPC=EMPC)			16.0

Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Enthalpy ID	1221-831-004-1	Prep Batch	EU13049	Sample Vol (mL)	N/A
Sample Name	Run FPB	Prep Date	2022-02-22 13:40	Extract Vol (mL)	0.02
Matrix	Air	Analysis Date	2022-03-01 13:49	Split Factor	2
Sampling Date	20220127 00:00	Analyst	bahager / hallen	Method Code	WM-001
Received Date	2022-02-01 11:30	Instrument	Galadriel	Sample Type	Sample

	Compound	CAS	Extract Concentration pg/uL	Sample Concentration pg	Formatted Result pg	LOQ pg	DL pg	EDL pg	Recovery Limits	Recovery	Flags
TCDD	2378-TCDD (S)	1746-01-6	ND	ND	ND	5.00	3.46	2.63			U
PeCDD	12378-PeCDD (S)	40321-76-4	ND	ND	ND	25.0	2.35	3.10			U
HxCDD	123478-HxCDD (S)	39227-28-6	ND	ND	ND	25.0	4.97	2.77			U
	123678-HxCDD (S)	57653-85-7	ND	ND	ND	25.0	4.62	3.00			U
	123789-HxCDD (S)	19408-74-3	ND	ND	ND	25.0	5.78	3.11			U
HpCDD	1234678-HpCDD (S)	35822-46-9	ND	ND	ND	25.0	6.85	3.67			U
OCDD	OCDD (S)	3268-87-9	ND	ND	ND	50.0	6.82	5.86			U
TCDF	2378-TCDF (S)	51207-31-9	ND	ND	ND	5.00	1.47	1.92			U
PeCDF	12378-PeCDF (S)	57117-41-6	ND	ND	ND	25.0	3.24	2.55			U
	23478-PeCDF (S)	57117-31-4	ND	ND	ND	25.0	2.53	2.67			U
HxCDF	123478-HxCDF (S)	70648-26-9	ND	ND	ND	25.0	3.55	1.87			U
	123678-HxCDF (S)	57117-44-9	ND	ND	ND	25.0	3.24	2.01			U
	234678-HxCDF (S)	60851-34-5	ND	ND	ND	25.0	3.87	1.79			U
	123789-HxCDF (S)	72918-21-9	ND	ND	ND	25.0	3.12	2.19			U
HpCDF	1234678-HpCDF (S)	67562-39-4	ND	ND	ND	25.0	2.68	2.46			U
	1234789-HpCDF (S)	55673-89-7	ND	ND	ND	25.0	1.99	2.92			U
OCDF	OCDF (S)	39001-02-0	ND	ND	ND	50.0	11.7	5.39			U
ES	13C-2378-TCDD (ES)	76523-40-5	78.32	3133				9.49	40-135%	78.3%	
	13C-12378-PeCDD (ES)	109719-79-1	78.11	3124				13.0	40-135%	78.1%	
	13C-123478-HxCDD (ES)	109719-80-4	78.71	3148				14.2	40-135%	78.7%	
	13C-123678-HxCDD (ES)	109719-81-5	77.38	3095				15.0	40-135%	77.4%	
	13C-123789-HxCDD (ES)	109719-82-6	77.40	3096				13.1	40-135%	77.4%	
	13C-1234678-HpCDD (ES)	109719-83-7	76.03	3041				10.4	40-135%	76.0%	
	13C-OCDD (ES)	114423-97-1	112.17	4487				8.63	40-135%	56.1%	
	13C-2378-TCDF (ES)	89059-46-1	87.09	3483				19.6	40-135%	87.1%	
	13C-12378-PeCDF (ES)	109719-77-9	79.39	3175				14.9	40-135%	79.4%	
	13C-23478-PeCDF (ES)	116843-02-8	76.97	3079				15.1	40-135%	77.0%	
	13C-123478-HxCDF (ES)	114423-98-2	80.31	3212				16.3	40-135%	80.3%	
	13C-123678-HxCDF (ES)	116843-03-9	80.11	3204				14.5	40-135%	80.1%	
	13C-234678-HxCDF (ES)	116843-05-1	80.40	3216				14.8	40-135%	80.4%	
	13C-123789-HxCDF (ES)	116843-04-0	80.59	3223				15.4	40-135%	80.6%	
	13C-1234678-HpCDF (ES)	109719-84-8	76.76	3070				18.2	40-135%	76.8%	
	13C-1234789-HpCDF (ES)	109719-94-0	77.40	3096				19.7	40-135%	77.4%	
	13C-OCDF (ES)	109719-78-0	126.26	5050				10.3	40-135%	63.1%	
SS	37Cl-2378-TCDD (SS)		49.13	1965				2.38	70-130%	122.8%	
	13C-12347-PeCDD (SS)		95.87	3835				15.9	70-130%	95.9%	
	13C-12346-PeCDF (SS)		96.32	3853				17.4	70-130%	96.3%	
	13C-123469-HxCDF (SS)		94.75	3790				20.3	70-130%	94.8%	
	13C-1234689-HpCDF (SS)		104.88	4195				23.6	70-130%	104.9%	
AS	13C-1368-TCDD (AS)		85.80	3432				8.81	20-150%	85.8%	
	13C-1368-TCDF (AS)		85.10	3404				17.2	20-150%	85.1%	

TCDD group total:		41903-57-5	ND	ND				2.63			
PeCDD group total:		36088-22-9	ND	ND				3.10			
HxCDD group total:		34465-46-8	ND	ND				2.96			
HpCDD group total:		37871-00-4	ND	ND				3.67			
OCDD group total:			ND	ND				5.86			
TCDF group total:		55722-27-5	ND	ND				1.92			
PeCDF group total:		30402-15-4	ND	ND				2.61			
HxCDF group total:		55684-94-1	ND	ND				1.96			
HpCDF group total:		38998-75-3	ND	ND				2.69			
OCDF group total:			ND	ND				5.39			

TEQ	ITEQ (ND=0; EMPC=0)			0
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)			3.81
	ITEQ (ND=EDL EMPC=EDL)			7.61
	ITEQ (ND=0; EMPC=EMPC)			0
	ITEQ (ND=1/2EDL; EMPC=EMPC)			3.81
	ITEQ (ND=EDL; EMPC=EMPC)			7.61
	WTEQ (ND=0; EMPC=0)			0
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)			4.29
	WTEQ (ND=EDL EMPC=EDL)			8.57
	WTEQ (ND=0; EMPC=EMPC)			0
	WTEQ (ND=1/2EDL; EMPC=EMPC)			4.29
	WTEQ (ND=EDL; EMPC=EMPC)			8.57

Run 1	Detailed Results - PAH (SOP EU052)

Client Details

Client Sample ID:	Run 1	**Client Name:**	**Montrose Air Quality Services, LLC - Portland**
Client Project ID:	006AS-011833	**Sample Collection Date:**	**26-Jan-22** **RRFs:** **ICAL**

Lab/Sample Details

Lab Job #:	**1221-831**	**Matrix:**	**Matrix**	**Date Received:**	**25-Feb-22**
Lab Sample ID:	**1221-831_13049_001**	**Weight/Volume:**	**1**	**Date Extracted:**	**22-Feb-22**
QC Batch #:	**13049**	**Split Factor:**	**4**	**Date Analyzed:**	**04-Mar-22**
				Time Analyzed:	**19:13:31**

Analyte	Conc. (ng)	EDL (ng)		Qualifiers	Standard	ES Recoveries	Qualifiers
Naphthalene	106000	273		E SAT	ES Naphthalene	86.9	
2-Methyl-naphthalene	102000	5.89		E	ES 2-Methyl-naphthalene	111	
Acenaphthylene	2710	26.2			ES Acenaphthylene	75.8	
Acenaphthene	1100	207			ES Acenaphthene	93.1	
Fluorene	5390	26.5			ES Fluorene	88.9	
Phenanthrene	15900	11.4			ES Phenanthrene	90.5	
Anthracene	2220	17.7			ES Anthracene	71.8	
Fluoranthene	4050	9.72			ES Fluoranthene	84.0	
Pyrene	3000	9.75			ES Pyrene	86.0	
Benzo(a)Anthracene	968	6.87		J	ES Benzo(a)Anthracene	93.7	
Chrysene	1210	6.05			ES Chrysene	91.0	
Benzo(b)Fluoranthene	415	4.54		J	ES Benzo(b)Fluoranthene	89.1	
Benzo(k)Fluoranthene	84.4	5.34		J	ES Benzo(k)Fluoranthene	80.8	
Benzo(e)Pyrene	105	5.42		J	ES Benzo(e)Pyrene	80.7	
Benzo(a)Pyrene	25.2	7.88		JB	ES Benzo(a)Pyrene	79.3	
Perylene	ND	10.4		U	ES Perylene	54.5	
Indeno(123-cd)Pyrene	ND	9.53		U	ES Indeno(123-cd)Pyrene	120	
Benzo(ghi)Perylene	33.1	10.7		J	ES Benzo(ghi)Perylene	81.1	
Dibenzo(a,h)Anthracene	ND	10.3		U	ES Dibenzo(a,h)Anthracene	88.2	
					Standard	**CS/AS Recoveries**	**Qualifiers**
					CS Fluorene	88.6	
					CS Terphenyl	84.7	
					AS Anthracene	78.0	
Total PAHs	**245000**						

ENTHALPY ANALYTICAL

Run 2	Detailed Results - PAH (SOP EU052)

Client Details

Client Sample ID:	Run 2	**Client Name:**	**Montrose Air Quality Services, LLC - Portland**
Client Project ID:	006AS-011833	**Sample Collection Date:**	**27-Jan-22** **RRFs:** **ICAL**

Lab/Sample Details

Lab Job #:	**1221-831**	**Matrix:**	**Matrix**	**Date Received:**	**25-Feb-22**
Lab Sample ID:	**1221-831_13049_002**	**Weight/Volume:**	**1**	**Date Extracted:**	**22-Feb-22**
QC Batch #:	**13049**	**Split Factor:**	**4**	**Date Analyzed:**	**04-Mar-22**
				Time Analyzed:	**19:55:29**

Analyte	Conc. (ng)	EDL (ng)		Qualifiers	Standard	ES Recoveries	Qualifiers
Naphthalene	162000	302		E SAT	ES Naphthalene	69.3	
2-Methyl-naphthalene	107000	4.98		E	ES 2-Methyl-naphthalene	109	
Acenaphthylene	2190	56.0			ES Acenaphthylene	20.4	
Acenaphthene	849	23.6		J	ES Acenaphthene	61.1	
Fluorene	3210	12.0			ES Fluorene	74.4	
Phenanthrene	9400	5.23			ES Phenanthrene	69.0	
Anthracene	ND	10.3		U	ES Anthracene	50.2	
Fluoranthene	1920	7.85			ES Fluoranthene	78.6	
Pyrene	884	10.4		J	ES Pyrene	58.4	
Benzo(a)Anthracene	314	7.09		J	ES Benzo(a)Anthracene	74.7	
Chrysene	816	6.06		J	ES Chrysene	84.7	
Benzo(b)Fluoranthene	230	4.41		J	ES Benzo(b)Fluoranthene	87.7	
Benzo(k)Fluoranthene	54.0	5.41		J	ES Benzo(k)Fluoranthene	72.1	
Benzo(e)Pyrene	45.9	6.03		J	ES Benzo(e)Pyrene	61.0	
Benzo(a)Pyrene	ND	11.0		U	ES Benzo(a)Pyrene	44.3	
Perylene	ND	13.0		U	ES Perylene	38.5	
Indeno(123-cd)Pyrene	ND	11.8		U	ES Indeno(123-cd)Pyrene	71.5	
Benzo(ghi)Perylene	43.1	14.3		JB	ES Benzo(ghi)Perylene	54.0	
Dibenzo(a,h)Anthracene	ND	11.4		U	ES Indeno(123-cd)Pyrene	66.1	
					Standard	**CS/AS Recoveries**	**Qualifiers**
					CS Fluorene	69.6	
					CS Terphenyl	83.0	
					AS Anthracene	76.1	
Total PAHs	**289000**						

Run 3	Detailed Results - PAH (SOP EU052)

Client Details

Client Sample ID:	Run 3	**Client Name:**	**Montrose Air Quality Services, LLC - Portland**
Client Project ID:	006AS-011833	**Sample Collection Date:**	**27-Jan-22** **RRFs: ICAL**

Lab/Sample Details

Lab Job #:	**1221-831**	**Matrix:**	**Matrix**	**Date Received:**	**25-Feb-22**
Lab Sample ID:	**1221-831_13049_003**	**Weight/Volume:**	**1**	**Date Extracted:**	**22-Feb-22**
QC Batch #:	**13049**	**Split Factor:**	**4**	**Date Analyzed:**	**04-Mar-22**
				Time Analyzed:	**20:37:26**

Analyte	Conc. (ng)	EDL (ng)		Qualifiers	Standard	ES Recoveries	Qualifiers
Naphthalene	130000	308		E SAT	ES Naphthalene	70.2	
2-Methyl-naphthalene	94800	4.30			ES 2-Methyl-naphthalene	102	
Acenaphthylene	2610	75.5			ES Acenaphthylene	29.0	
Acenaphthene	1090	101			ES Acenaphthene	71.1	
Fluorene	4100	9.58			ES Fluorene	79.4	
Phenanthrene	11500	9.78			ES Phenanthrene	76.9	
Anthracene	1860	15.6			ES Anthracene	61.2	
Fluoranthene	3390	9.31			ES Fluoranthene	74.6	
Pyrene	2350	10.2			ES Pyrene	67.4	
Benzo(a)Anthracene	857	7.85		J	ES Benzo(a)Anthracene	69.5	
Chrysene	1170	7.11			ES Chrysene	76.5	
Benzo(b)Fluoranthene	420	4.19		J	ES Benzo(b)Fluoranthene	78.3	
Benzo(k)Fluoranthene	69.5	4.54		J	ES Benzo(k)Fluoranthene	74.4	
Benzo(e)Pyrene	110	4.50		J	ES Benzo(e)Pyrene	70.0	
Benzo(a)Pyrene	ND	8.29		U	ES Benzo(a)Pyrene	56.0	
Perylene	ND	25.8		U	ES Perylene	21.6	
Indeno(123-cd)Pyrene	ND	11.5		U	ES Indeno(123-cd)Pyrene	65.8	
Benzo(ghi)Perylene	67.9	11.8		JB	ES Benzo(ghi)Perylene	58.2	
Dibenzo(a,h)Anthracene	ND	9.58		U	ES Indeno(123-cd)Pyrene	74.9	
					Standard	**CS/AS Recoveries**	**Qualifiers**
					CS Fluorene	76.9	
					CS Terphenyl	78.9	
					AS Anthracene	79.9	
Total PAHs	**254000**						

ENTHALPY ANALYTICAL

Run FPB				Detailed Results - PAH (SOP EU052)			
Client Details							
Client Sample ID:	Run FPB			**Client Name:**	Montrose Air Quality Services, LLC - Portland		
Client Project ID:	006AS-011833			**Sample Collection Date:**	27-Jan-22	**RRFs:**	ICAL
Lab/Sample Details							
Lab Job #:	**1221-831**	**Matrix:**	**Matrix**	**Date Received:**	**25-Feb-22**		
Lab Sample ID:	**1221-831_13049_004**	**Weight/Volume:**	**1**	**Date Extracted:**	**22-Feb-22**		
QC Batch #:	**13049**	**Split Factor:**	**4**	**Date Analyzed:**	**04-Mar-22**		
				Time Analyzed:	**21:19:23**		

Analyte	Conc. (ng)	EDL (ng)		Qualifiers	Standard	ES Recoveries	Qualifiers
Naphthalene	9720	7.17		B	ES Naphthalene	50.8	
2-Methyl-naphthalene	1920	4.97		B	ES 2-Methyl-naphthalene	54.7	
Acenaphthylene	ND	4.50		U	ES Acenaphthylene	56.7	
Acenaphthene	ND	4.19		U	ES Acenaphthene	58.3	
Fluorene	37.9	3.23		JB	ES Fluorene	63.1	
Phenanthrene	110	3.71		J	ES Phenanthrene	54.2	
Anthracene	10.8	4.84		J	ES Anthracene	51.4	
Fluoranthene	44.2	3.03		JB	ES Fluoranthene	76.6	
Pyrene	87.6	2.87		JB	ES Pyrene	77.7	
Benzo(a)Anthracene	13.5	2.76		J	ES Benzo(a)Anthracene	72.4	
Chrysene	15.2	2.84		J	ES Chrysene	70.3	
Benzo(b)Fluoranthene	21.7	2.51		JB	ES Benzo(b)Fluoranthene	83.6	
Benzo(k)Fluoranthene	8.96	2.63		J	ES Benzo(k)Fluoranthene	80.8	
Benzo(e)Pyrene	12.7	2.59		JB	ES Benzo(e)Pyrene	80.6	
Benzo(a)Pyrene	9.41	4.27		JB	ES Benzo(a)Pyrene	74.0	
Perylene	ND	5.16		U	ES Perylene	54.8	
Indeno(123-cd)Pyrene	ND	5.98		U	ES Indeno(123-cd)Pyrene	87.4	
Benzo(ghi)Perylene	34.0	5.93		JB	ES Benzo(ghi)Perylene	80.4	
Dibenzo(a,h)Anthracene	ND	7.16		U	ES Indeno(123-cd)Pyrene	77.1	
					Standard	**CS/AS Recoveries**	**Qualifiers**
					CS Fluorene	64.2	
					CS Terphenyl	75.3	
					AS Anthracene	59.3	
Total PAHs	**12000**						

QC Data

Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Enthalpy ID	MB-13049-DF	Prep Batch	EU13049	Sample Vol (mL)	N/A
Sample Name	MB-13049-DF	Prep Date	2022-02-22 13:40	Extract Vol (mL)	0.02
Matrix	Air	Analysis Date	2022-03-02 13:28	Split Factor	2
Sampling Date		Analyst	bahager / hallen	Method Code	WM-001
Received Date		Instrument	Galadriel	Sample Type	Blank

	Compound	CAS	Extract Concentration pg/uL	Sample Concentration pg	Formatted Result pg	LOQ pg	DL pg	EDL pg	Recovery Limits	Recovery	Flags
TCDD	2378-TCDD (S)	1746-01-6	ND	ND	ND	5.00	3.46	3.24			U
PeCDD	12378-PeCDD (S)	40321-76-4	ND	ND	ND	25.0	2.35	3.69			U
HxCDD	123478-HxCDD (S)	39227-28-6	ND	ND	ND	25.0	4.97	3.45			U
	123678-HxCDD (S)	57653-85-7	ND	ND	ND	25.0	4.62	3.18			U
	123789-HxCDD (S)	19408-74-3	ND	ND	ND	25.0	5.78	3.22			U
HpCDD	1234678-HpCDD (S)	35822-46-9	ND	ND	ND	25.0	6.85	5.53			U
OCDD	OCDD (S)	3268-87-9	ND	ND	ND	50.0	6.82	10.3			U
TCDF	2378-TCDF (S)	51207-31-9	ND	ND	ND	5.00	1.47	1.97			U
PeCDF	12378-PeCDF (S)	57117-41-6	ND	ND	ND	25.0	3.24	2.38			U
	23478-PeCDF (S)	57117-31-4	ND	ND	ND	25.0	2.53	2.27			U
HxCDF	123478-HxCDF (S)	70648-26-9	ND	ND	ND	25.0	3.55	2.14			U
	123678-HxCDF (S)	57117-44-9	ND	ND	ND	25.0	3.24	2.02			U
	234678-HxCDF (S)	60851-34-5	ND	ND	ND	25.0	3.87	2.04			U
	123789-HxCDF (S)	72918-21-9	ND	ND	ND	25.0	3.12	2.27			U
HpCDF	1234678-HpCDF (S)	67562-39-4	ND	ND	ND	25.0	2.68	4.78			U
	1234789-HpCDF (S)	55673-89-7	ND	ND	ND	25.0	1.99	5.84			U
OCDF	OCDF (S)	39001-02-0	ND	ND	ND	50.0	11.7	5.24			U
ES	13C-2378-TCDD (ES)	76523-40-5	83.11	3324				12.6	40-135%	83.1%	
	13C-12378-PeCDD (ES)	109719-79-1	82.36	3294				16.1	40-135%	82.4%	
	13C-123478-HxCDD (ES)	109719-80-4	76.37	3055				17.5	40-135%	76.4%	
	13C-123678-HxCDD (ES)	109719-81-5	85.93	3437				18.5	40-135%	85.9%	
	13C-123789-HxCDD (ES)	109719-82-6	83.63	3345				16.1	40-135%	83.6%	
	13C-1234678-HpCDD (ES)	109719-83-7	83.61	3344				16.4	40-135%	83.6%	
	13C-OCDD (ES)	114423-97-1	130.11	5204				13.9	40-135%	65.1%	
	13C-2378-TCDF (ES)	89059-46-1	89.75	3590				21.5	40-135%	89.8%	
	13C-12378-PeCDF (ES)	109719-77-9	81.76	3270				22.6	40-135%	81.8%	
	13C-23478-PeCDF (ES)	116843-02-8	83.03	3321				22.9	40-135%	83.0%	
	13C-123478-HxCDF (ES)	114423-98-2	88.96	3558				28.3	40-135%	89.0%	
	13C-123678-HxCDF (ES)	116843-03-9	91.38	3655				25.2	40-135%	91.4%	
	13C-234678-HxCDF (ES)	116843-05-1	89.27	3571				25.7	40-135%	89.3%	
	13C-123789-HxCDF (ES)	116843-04-0	90.09	3603				26.8	40-135%	90.1%	
	13C-1234678-HpCDF (ES)	109719-84-8	86.68	3467				27.6	40-135%	86.7%	
	13C-1234789-HpCDF (ES)	109719-94-0	81.45	3258				30.0	40-135%	81.4%	
	13C-OCDF (ES)	109719-78-0	147.14	5886				16.1	40-135%	73.6%	
SS	37Cl-2378-TCDD (SS)		52.21	2088				2.70	70-130%	130.5%	Q
	13C-12347-PeCDD (SS)		96.31	3852				18.3	70-130%	96.3%	
	13C-12346-PeCDF (SS)		103.59	4144				28.3	70-130%	103.6%	
	13C-123469-HxCDF (SS)		94.07	3763				28.1	70-130%	94.1%	
	13C-1234689-HpCDF (SS)		103.80	4152				32.5	70-130%	103.8%	
AS	13C-1368-TCDD (AS)		96.56	3862				11.7	20-150%	96.6%	
	13C-1368-TCDF (AS)		93.35	3734				19.0	20-150%	93.4%	

TCDD group total:		41903-57-5	ND	ND				3.24			
PeCDD group total:		36088-22-9	ND	ND				3.69			
HxCDD group total:		34465-46-8	ND	ND				3.28			
HpCDD group total:		37871-00-4	ND	ND				5.53			
OCDD group total:			ND	ND				10.3			
TCDF group total:		55722-27-5	ND	ND				1.97			
PeCDF group total:		30402-15-4	ND	ND				2.33			
HxCDF group total:		55684-94-1	ND	ND				2.12			
HpCDF group total:		38998-75-3	ND	ND				5.31			
OCDF group total:			ND	ND				5.24			

TEQ	ITEQ (ND=0; EMPC=0)	0
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)	4.28
	ITEQ (ND=EDL EMPC=EDL)	8.55
	ITEQ (ND=0; EMPC=EMPC)	0
	ITEQ (ND=1/2EDL; EMPC=EMPC)	4.28
	ITEQ (ND=EDL; EMPC=EMPC)	8.55
	WTEQ (ND=0; EMPC=0)	0
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)	4.94
	WTEQ (ND=EDL EMPC=EDL)	9.89
	WTEQ (ND=0; EMPC=EMPC)	0
	WTEQ (ND=1/2EDL; EMPC=EMPC)	4.94
	WTEQ (ND=EDL; EMPC=EMPC)	9.89

Enthalpy Analytical

Job No.: 1221-831-4 EPA Method 23 (Revised)

Montrose Air Quality Services, LLC - Portland 006AS-011833 Ecotube RTO #1 Outlet

Enthalpy ID	BCS-13049-DF	Prep Batch	EU13049	Sample Vol (mL)	N/A
Sample Name	BCS-13049-DF	Prep Date	2022-02-22 13:40	Extract Vol (mL)	0.04
Matrix	Air	Analysis Date	2022-03-02 10:55	Split Factor	1
Sampling Date		Analyst	bahager / hallen	Method Code	WM-001
Received Date		Instrument	Galadriel	Sample Type	Control

	Compound	CAS	Extract Concentration pg/uL	Sample Concentration pg	Formatted Result pg	LOQ pg	DL pg	EDL pg	Recovery Limits	Recovery	Flags
TCDD	2378-TCDD (S)	1746-01-6	10.84	434	434	10.0	6.92	3.83	70-130%	108.4%	
PeCDD	12378-PeCDD (S)	40321-76-4	49.39	1976	1980	50.0	4.70	11.7	70-130%	98.8%	
HxCDD	123478-HxCDD (S)	39227-28-6	49.08	1963	1960	50.0	9.94	15.1	70-130%	98.2%	
	123678-HxCDD (S)	57653-85-7	49.27	1971	1970	50.0	9.24	16.1	70-130%	98.5%	
	123789-HxCDD (S)	19408-74-3	52.18	2087	2090	50.0	11.6	16.3	70-130%	104.4%	
HpCDD	1234678-HpCDD (S)	35822-46-9	52.81	2113	2110	50.0	13.7	12.5	70-130%	105.6%	
OCDD	OCDD (S)	3268-87-9	103.19	4128	4130	100	13.6	13.6	70-130%	103.2%	
TCDF	2378-TCDF (S)	51207-31-9	10.88	435	435	10.0	2.94	3.47	70-130%	108.8%	
PeCDF	12378-PeCDF (S)	57117-41-6	53.34	2133	2130	50.0	6.48	9.00	70-130%	106.7%	
	23478-PeCDF (S)	57117-31-4	53.45	2138	2140	50.0	5.06	9.62	70-130%	106.9%	
HxCDF	123478-HxCDF (S)	70648-26-9	49.69	1987	1990	50.0	7.10	12.0	70-130%	99.4%	
	123678-HxCDF (S)	57117-44-9	48.95	1958	1960	50.0	6.48	11.8	70-130%	97.9%	
	234678-HxCDF (S)	60851-34-5	48.66	1946	1950	50.0	7.74	10.9	70-130%	97.3%	
	123789-HxCDF (S)	72918-21-9	50.27	2011	2010	50.0	6.24	12.9	70-130%	100.5%	
HpCDF	1234678-HpCDF (S)	67562-39-4	51.85	2074	2070	50.0	5.36	8.40	70-130%	103.7%	
	1234789-HpCDF (S)	55673-89-7	50.91	2036	2040	50.0	3.98	10.0	70-130%	101.8%	
OCDF	OCDF (S)	39001-02-0	102.14	4086	4090	100	23.4	11.9	70-130%	102.1%	
ES	13C-2378-TCDD (ES)	76523-40-5	89.70	3588				11.4	40-135%	89.7%	
	13C-12378-PeCDD (ES)	109719-79-1	84.13	3365				18.1	40-135%	84.1%	
	13C-123478-HxCDD (ES)	109719-80-4	103.37	4135				25.5	40-135%	103.4%	
	13C-123678-HxCDD (ES)	109719-81-5	102.22	4089				26.9	40-135%	102.2%	
	13C-123789-HxCDD (ES)	109719-82-6	99.91	3996				23.5	40-135%	99.9%	
	13C-1234678-HpCDD (ES)	109719-83-7	107.34	4294				21.4	40-135%	107.3%	
	13C-OCDD (ES)	114423-97-1	197.60	7904				21.9	40-135%	98.8%	
	13C-2378-TCDF (ES)	89059-46-1	98.62	3945				22.5	40-135%	98.6%	
	13C-12378-PeCDF (ES)	109719-77-9	90.01	3600				23.7	40-135%	90.0%	
	13C-23478-PeCDF (ES)	116843-02-8	87.88	3515				24.0	40-135%	87.9%	
	13C-123478-HxCDF (ES)	114423-98-2	108.31	4332				34.8	40-135%	108.3%	
	13C-123678-HxCDF (ES)	116843-03-9	112.33	4493				31.0	40-135%	112.3%	
	13C-234678-HxCDF (ES)	116843-05-1	113.31	4532				31.6	40-135%	113.3%	
	13C-123789-HxCDF (ES)	116843-04-0	108.31	4333				32.9	40-135%	108.3%	
	13C-1234678-HpCDF (ES)	109719-84-8	113.72	4549				32.8	40-135%	113.7%	
	13C-1234789-HpCDF (ES)	109719-94-0	114.64	4586				35.6	40-135%	114.6%	
	13C-OCDF (ES)	109719-78-0	213.86	8555				15.2	40-135%	106.9%	
SS	37Cl-2378-TCDD (SS)		47.15	1886				3.01	70-130%	117.9%	
	13C-12347-PeCDD (SS)		96.15	3846				20.2	70-130%	96.2%	
	13C-12346-PeCDF (SS)		91.94	3678				24.5	70-130%	91.9%	
	13C-123469-HxCDF (SS)		86.29	3452				30.5	70-130%	86.3%	
	13C-1234689-HpCDF (SS)		91.99	3680				28.6	70-130%	92.0%	
AS	13C-1368-TCDD (AS)		100.39	4016				10.6	20-150%	100.4%	
	13C-1368-TCDF (AS)		101.85	4074				19.8	20-150%	101.8%	

TCDD group total:		41903-57-5	45.07	1803				3.83			
PeCDD group total:		36088-22-9	174.71	6988				11.7			
HxCDD group total:		34465-46-8	214.17	8567				15.8			
HpCDD group total:		37871-00-4	124.18	4967				12.5			
OCDD group total:			103.19	4128				13.6			
TCDF group total:		55722-27-5	50.04	2002				3.47			
PeCDF group total:		30402-15-4	171.50	6860				9.31			
HxCDF group total:		55684-94-1	249.87	9995				11.9			
HpCDF group total:		38998-75-3	102.76	4111				9.20			
OCDF group total:			102.14	4086				11.9			

TEQ	ITEQ (ND=0; EMPC=0)		4103
	ITEQ (ND=1/2EDL;EMPC=1/2EDL)		4103
	ITEQ (ND=EDL EMPC=EDL)		4103
	ITEQ (ND=0; EMPC=EMPC)		4103
	ITEQ (ND=1/2EDL; EMPC=EMPC)		4103
	ITEQ (ND=EDL; EMPC=EMPC)		4103
	WTEQ (ND=0; EMPC=0)		4615
	WTEQ (ND=1/2EDL;EMPC=1/2EDL)		4615
	WTEQ (ND=EDL EMPC=EDL)		4615
	WTEQ (ND=0; EMPC=EMPC)		4615
	WTEQ (ND=1/2EDL; EMPC=EMPC)		4615
	WTEQ (ND=EDL; EMPC=EMPC)		4615

Method Blank 1

Detailed Results - PAH (SOP EU052)

RRFs: ICAL

Lab/Sample Details

		Matrix:	Matrix		
Lab Sample ID:	MB_13049_PAH	Weight/Volume:	1	Date Extracted:	22-Feb-22
QC Batch #:	13049	Split Factor:	4	Date Analyzed:	04-Mar-22
				Time Analyzed:	18:31:33

Analyte	Conc. (ng)	EDL (ng)		Qualifiers	Standard	ES Recoveries	Qualifiers
Naphthalene	2050	37.3			ES Naphthalene	42.7	
2-Methyl-naphthalene	297	0.0486		J	ES 2-Methyl-naphthalene	64.8	
Acenaphthylene	0.841	0.125		J	ES Acenaphthylene	71.3	
Acenaphthene	0.985	0.191		J	ES Acenaphthene	69.9	
Fluorene	14.3	0.260		J	ES Fluorene	66.1	
Phenanthrene	10.9	0.0134		J	ES Phenanthrene	70.9	
Anthracene	ND	0.0178		U	ES Anthracene	69.2	
Fluoranthene	22.9	0.0579		J	ES Fluoranthene	66.6	
Pyrene	75.9	0.0550		J	ES Pyrene	65.6	
Benzo(a)Anthracene	1.07	0.0495		J	ES Benzo(a)Anthracene	75.1	
Chrysene	1.46	0.0483		J	ES Chrysene	74.6	
Benzo(b)Fluoranthene	2.84	0.0284		J	ES Benzo(b)Fluoranthene	66.6	
Benzo(k)Fluoranthene	0.893	0.0278		J	ES Benzo(k)Fluoranthene	64.3	
Benzo(e)Pyrene	3.20	0.0296		J	ES Benzo(e)Pyrene	61.1	
Benzo(a)Pyrene	3.25	0.0367		J	ES Benzo(a)Pyrene	63.7	
Perylene	0.846	0.0435		J	ES Perylene	56.1	
Indeno(123-cd)Pyrene	1.96	0.0545		J	ES Indeno(123-cd)Pyrene	80.9	
Benzo(ghi)Perylene	9.22	0.0541		J	ES Benzo(ghi)Perylene	68.2	
Dibenzo(a,h)Anthracene	0.208	0.0542		J	ES Indeno(123-cd)Pyrene	76.4	
					Standard	**CS/AS Recoveries**	**Qualifiers**
					CS Fluorene	65.9	
					CS Terphenyl	74.6	
					AS Anthracene	78.5	
Total PAHs	**2500**						

Batch Control Spike — Batch: 13049 — PAHs

	BCS
Concentration (pg/µL)	0.4
Acquisition Date	04-Mar-22
Acquisition Time	17:07:37

Analyte	RRF	Avg. CS3 RRF	PD (BCS vs. CS3) (%)	Limit (%)	In Limit?	Concentration (pg/uL)
Naphthalene	1.11	1.09	1.8	20.0	Y	0.102
2-Methyl-naphthalene	1.05	1.03	2.4	20.0	Y	0.102
Acenaphthylene	1.20	1.09	10.1	20.0	Y	0.110
Acenaphthene	1.08	1.07	1.4	20.0	Y	0.101
Fluorene	1.08	1.06	1.9	20.0	Y	0.102
Phenanthrene	1.05	1.06	-0.5	20.0	Y	0.0995
Anthracene	1.13	1.14	-0.9	20.0	Y	0.0991
Fluoranthene	1.03	1.02	1.5	20.0	Y	0.101
Pyrene	0.98	0.98	0.5	20.0	Y	0.101
Benzo(a)Anthracene	1.04	1.02	2.5	20.0	Y	0.102
Chrysene	1.03	1.00	3.0	20.0	Y	0.103
Benzo(b)Fluoranthene	1.08	1.07	0.9	20.0	Y	0.101
Benzo(k)Fluoranthene	1.06	1.05	1.0	20.0	Y	0.101
Benzo(e)Pyrene	1.10	1.06	3.8	20.0	Y	0.104
Benzo(a)Pyrene	1.13	1.13	0.4	20.0	Y	0.100
Perylene	1.22	1.22	0.0	20.0	Y	0.100
Indeno(123-cd)Pyrene	1.01	1.01	0.5	20.0	Y	0.100
Benzo(ghi)Perylene	1.02	1.03	-0.5	20.0	Y	0.0995
Dibenzo(a,h)Anthracene	1.02	0.97	5.7	20.0	Y	0.106
ES Naphthalene	1.17	1.21	-3.3	50.0	Y	96.7
ES 2-Methyl-naphthalene	0.89	0.87	2.9	50.0	Y	103
ES Acenaphthylene	1.33	1.24	7.3	50.0	Y	107
ES Acenaphthene	1.01	0.97	4.1	50.0	Y	104
ES Fluorene	1.17	1.10	6.8	50.0	Y	107
ES Phenanthrene	1.89	1.74	8.9	50.0	Y	109
ES Anthracene	1.54	1.37	12.4	50.0	Y	112
ES Fluoranthene	1.21	1.17	3.9	50.0	Y	104
ES Pyrene	1.32	1.25	6.0	50.0	Y	106
ES Benzo(a)Anthracene	1.07	0.99	8.1	50.0	Y	108
ES Chrysene	1.19	1.11	7.2	50.0	Y	107
ES Benzo(b)Fluoranthene	1.62	1.56	3.8	50.0	Y	104
ES Benzo(k)Fluoranthene	1.85	1.74	6.3	50.0	Y	106
ES Benzo(e)Pyrene	1.70	1.63	4.6	50.0	Y	105
ES Benzo(a)Pyrene	1.50	1.40	7.1	50.0	Y	107
ES Perylene	1.26	1.21	4.6	50.0	Y	105
ES Indeno(123-cd)Pyrene	1.27	1.21	5.4	50.0	Y	105
ES Benzo(ghi)Perylene	1.47	1.42	3.9	50.0	Y	104
ES Dibenzo(a,h)Anthracene	1.35	1.31	3.4	50.0	Y	103

Analyte	RRF	Avg. CS3 RRF	PD (BCS vs. CS3) (%)	Limit (%)	In Limit?	Concentration (pg/uL)
CS Fluorene	1.19	1.13	5.8	30.0	Y	106
CS Terphenyl	0.85	0.81	5.6	30.0	Y	106
SS Fluorene	1.01	1.03	-1.9	30.0	Y	98.1
SS Terphenyl	0.65	0.65	0.0	30.0	Y	100
AS Anthracene	1.14	1.06	7.5	50.0	Y	108

Analyte	Area
JS 2-Methylnaphthalene	564820
JS Acenaphthene	435395
JS Pyrene	663330
JS Benzo(a)Pyrene	449233

Narrative Summary

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Enthalpy Analytical Narrative Summary

Company	Montrose Air Quality Services, LLC - Portland
Job#	1221-831 : Modified CARB 429/ Revised M23
Client Project #	006AS-011833 Site: Ecolube

Custody	Dallas King of Enthalpy Analytical Wilmington received the samples (via FedEx) on 2/1/22 and 2/2/22 in three containers at 10.6°C, 4.2°C and 3.7°C. All samples were received in good condition. Prior to, during, and after analysis, the samples were stored in the laboratory with access only by authorized personnel of Enthalpy Analytical, LLC.
Analysis	The samples were analyzed by SOP EU052 (Analysis of PAHs in Multiple Matrices) using Agilent Technologies Model# 6890 High-Resolution GC/ Waters High-Resolution Mass-Spectrometer (HRGC/HRMS "Gandalf"). The samples were analyzed by revised M23 using SOP EU045 (Analysis of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans in Water, Soil, Tissues and Air by Isotope Dilution) Agilent Technologies Model# 6890 High-Resolution GC/ Waters High-Resolution Mass-Spectrometer (HRGC/HRMS "Galadriel"). Each sample consisted of 1 XAD trap, filter, 1 bottle of combined acetone and toluene rinse, and 1 bottle of combined impinger contents and rinses. After sampling by the client, the laboratory spiked the samples with Extraction Standard (ES), then Soxhlet extracted with hexane followed by toluene. After solvent exchange, each extract was spiked with Alternate Standard (AS). The extracts were divided into four parts. One quarter was used for the modified PAH analysis, two quarters (1/2) was used for the revised M23 and PCB analysis, and one quarter was used for semi-volatile analysis to report Chlorobenzene and Chlorophenol. No part of the sample was archived. Cleanup procedures were performed on the remaining quarter(s) of each extract for PAH and PCDD/PCDF analysis. Each final sample extract was transferred to an autosampler vial and spiked with Injection Standard (JS), prior to instrumentation.
Calibration	The analytes and labeled standards in the initial calibration exhibited RSDs less than 20%. The internal calibration verification (ICV) and continuing calibration met method criteria.
QC Notes	The HRMS system displayed mass resolving power of at least 10,000 during the analysis. Labeled and sampling (surrogate) standard recovery values in the Batch Control Spike and method blank were acceptable.

GC Resolution parameters were met.

The samples were extracted within the 30-day from collection holding time and analyzed within the 45-day from extraction to analysis holding time required by the method.

Reporting Notes

Modified Carb 429: except for sample FPB, the samples were observed to be yellow and had a fuel odor. These samples were further prepared for analysis by combining 5µL of extract with 295µL of Nonane and vortexed sufficiently to mix. These 60-fold dilutions were done to mitigate saturation of the instrument's detector and to reduce chromatographic noise.

An analyte concentration that exceeds the instrument's calibration range is flagged with an "E" in the "Qualifiers" column on the sample the report pages. An analyte concentration marked "SAT" in the "Qualifiers" column indicates the saturation of the instrument's detector by a flat-topped peak or peak area of 1.073x10^{e}9 or more. These results will have less accuracy than the values within the instrument calibration range.

Revised M23: 37Cl-2378-TCDD (SS) fell above method control limits in method blank (MB)-13049. 2378-TCDD is not detected in any of the samples; therefore, the data is reportable with no adverse impact.

The TEQ was calculated and reported using I-TEF and WHO-2005 TEF, calculated by multiplying the concentration for each 2,3,7,8-substituted PCDD/F by its toxic equivalency factor (TEF). The Totals and Detection Limits have been included in the report. The TEQ is reported with and without EMPCs included. Additionally, the TEQ may be reported with non-detects treated as having a concentration of zero, a concentration of one-half the EDL, and/or a concentration equal to the EDL

Any deviations from the requirements of the reference method or TNI Standard have been stated above.

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical, LLC in Wilmington NC is accredited by the Louisiana Department of Environmental Quality to the 2009 TNI Standard under certificate number 05075.

The samples were analyzed for PCB congers at Vista Analytical, 1104 Windfield Way, El Dorado Hills, CA. Results reported separately.

The samples were analyzed for Chlorophenol and Chlorobenzene at Enthalpy Analytical, LLC., 800 Capitola Dr., Durham, NC. Results reported separately.

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General Reporting Notes – Data Qualifiers

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC - Wilmington, NC data reports, unless specifically noted otherwise.

General Data Qualifiers

- B – The analyte was found in the method blank, at a concentration that was at least 10% of the amount in the sample.
- Cxx – Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group ('xx') are shown with the number of the lowest IUPAC co-eluter.
- E – The reported concentration exceeds the calibration range (upper point of the calibration curve). For HRMS data, this condition does not imply additional measurement uncertainty. For LC-MS/MS data, these values should be considered as having measurement uncertainty higher than values within the calibration range.
- EDL – Estimated Detection Level: The EDL is unique to isotope dilution methods and reflects the conditions of analysis at the time of analysis, including the equipment used. Where the MDL is a static value, the EDL is a dynamic value.
- EMPC – Estimated Maximum Possible Concentration: EMPC is specific to Dioxin/Furan tests to indicate the determined ion-abundance ratio was outside the allowed theoretical range (usually due to being near the detection limit, although it can very rarely be caused by a co-eluting interference). The EMPC concentration is adjusted to reflect the value at the theoretical ion-abundance ratio.
- IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria. The analyte concentration may be inaccurate due to interference.
- J – The analyte has a concentration below the minimum calibration level (LOQ value) but greater than the LOD. These values should be considered as having measurement uncertainty higher than values within the calibration range
- L - Indicates that an analyte has a concentration below the Minimum Detection Limit (MDL). The reported concentration is not recommended for regulatory use as the analyte signal may have a signal-to-noise ratio less than the criteria deemed necessary to be considered a detected analyte.
- LOD – Limit of Detection: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOD. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the minimum detection limit (MDL). The LOD is adjusted for sample weight or volume.
- LOQ – Limit of Quantitation: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOQ. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the reporting limit (RL). The LOQ is adjusted for sample weight or volume.

General Reporting Notes – Data Qualifiers

- <LOD() – Analyte was not found at a concentration high enough to be reported as detected. It is reported as less than the LOD, and the LOD is given in the parentheses.
- <LOQ() – Analyte was not found at a concentration high enough to be reported as above the QSM-defined LOQ or TNI defined Reporting Limit. It is reported as less than the LOQ, and the LOQ is given in the parentheses.
- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable due to issues observed in sample preparation or analysis.
- PR – The associated congener(s) is(are) poorly resolved.
- QI – Indicates the presence of a quantitative interference.
- RL – Reporting Limit. Lowest reportable value. The level is higher than the MDL.
- SI – Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
- U – The analyte was not detected.
- V / Q – The labeled standard recovery is not within method control limits.
- X – Indicates the result is from re-injection/repeat/second-column analysis.

Lab Identifiers/ Data Attributes

- AR – Indicates use of the archived portion of the sample extract.
- CU – Indicates a sample that required additional clean-up prior to HRMS injection/processing.
- D – Dilution Data. Result was obtained from the analysis of a dilution. The number that follows the "D" indicates the dilution factor.
- DE – Indicates a dilution performed with the addition of ES (Extraction Standard) solution.
- DUP – Designation for a duplicate sample.
- MS – Designation for a matrix spike.
- MSD – Designation for a matrix spike duplicate.
- R – Indicates a re-extraction of the sample.
- RJ – Indicates a reinjection of the sample extract.

General Reporting Notes – Data Qualifiers

- S – Indicates a sample split. The number that follows the "S" indicates the split factor.
- SAT – Indicates an analyte saturated the detector.

Sample Custody

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MONTROSE AIR QUALITY SERVICES

CHAIN OF COUSTODY

(Acetone/Toluene Rinses) Fedex, 7759 2882 0134, cooler, on ice, no seals, good condition DK 2/2/22 11:15 4.2°T9

1221-831

Portland Location
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050 | Fax (503) 255-0505

(Impinger Rinses) Fedex, 7759 2881 9840, Cooler 2 on ice, no seals, good condition DK 2/2/22 11:15 3.7°T9

(Traps/Filters) Fedex, 7759 1713 7497, cooler, blue ice, no seals, good condition

Lab info: Enthalpy

DK 2/1/22

Client / Project:	Project / Sample Location:	Test / Analytical Method:
Ecolube	RTO #1 Outlet	Revised Method 23 per Enthalpy SOPs
Project No.: 006AS-011833	**Purchase Order No:**	**Special Analysis / Detection Limit / Reporting Instructions:** Each dioxin&furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners, plus each PCB congener and PAH and PAN-deriviative listed. Chlorobenzene and chlorophenol. List is attached to this COC.
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com jheffernan@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
R1 Filter	1/26/22	1845	1			Cooler
R1 Ace & Tolu	1/26/22	1845	1		Acetone and Toluene	
R1 XAD Trap	1/26/22	1845	1			Cooler
R1 Imp Cont & Rinse	1/26/22	1845	1		H2O, Acetone and Toluene	
R2 Filter	1/27/22	1345	1			Cooler
R2 Ace & Tolu	1/27/22	1345	1		Acetone and Toluene	
R2 XAD Trap	1/27/22	1345	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
R3 Filter	1/27/22	1910	2			Cooler
R3 Ace & Tolu	1/27/22	1910	1		Acetone and Toluene	
R3 XAD Trap	1/27/22	1910	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
FPB Filter	1/27/22	1920	1			Cooler
FPB Ace & Tolu	1/27/22	1920	1		Acetone and Toluene	
FPB XAD Trap	1/27/22	1920	1			Cooler
FPB Imp Cont & Rinse	1/27/22	1920	1		H2O, Acetone and Toluene	
Total Containers			17			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
[signature]	1/31/22	1111	[signature]	2/1/22	11:30	10.6° T9

Key: PCDD = Polychlorinated Dibenzo-p-Dioxin, PCDF = Polychlorinated Dibenzofuran, FB = Field Blank, RB = Reagent Blank

MAQS Chain of Custody Macro-R4

This Is The Last Page Of This Report.

Enthalpy Analytical - Ultratrace

2714 Exchange Drive
Wilmington, NC 28405

Ecolube

Client Project # 006AS-011833

Analytical Report
(0322-012)

EPA SW-846 Method 8270D

Client Requested Target Compound List
Top Ten Tentatively Identified Compounds

Enthalpy Analytical, LLC
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
800-1 Capitola Drive Durham, NC 27713-4385

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 50 pages.

Quentisha L. Forrester

QA Review Performed by – Quentisha L. Forrester

Digitally signed by Quentisha Forrester
Date: 2022.03.16 11:27:10 -04'00'

Report Issued: 03/16/2022

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Results

Sample Name	: 1221-831-001 R1
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200462.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 17:36:28
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	1221-831-001 R1
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200462.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 17:36:28
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	117,837	4.34	40.0	-17.2	PASS
Naphthalene-d8 (I)	468,908	5.41	40.0	-11.2	PASS
Acenaphthene-d10 (I)	271,415	6.98	40.0	-10.0	PASS
Phenanthrene-d10 (I)	553,959	8.32	40.0	-7.3	PASS
Chrysene-d12 (I)	558,485	12.4	40.0	-5.1	PASS
Perylene-d12 (I)	566,111	16.5	40.0	-7.0	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	39,167	3.36	11.1	44.5	250	17.8	m FAIL
Phenol-d5 (surr)	0.00	3.94	0.00	0.0	250	0.00	m FAIL
2,4,6-Tribromophenol (surr)	107,581	7.68	75.5	301.9	250	121	FAIL

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	: 1221-831-001 R1 (conf)
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200463.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 18:09:15
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	1221-831-001 R1 (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200463.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 18:09:15
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	120,513	4.34	40.0	-15.3	PASS
Naphthalene-d8 (I)	467,640	5.41	40.0	-11.5	PASS
Acenaphthene-d10 (I)	283,463	6.98	40.0	-6.0	PASS
Phenanthrene-d10 (I)	566,543	8.32	40.0	-5.2	PASS
Chrysene-d12 (I)	573,405	12.4	40.0	-2.5	PASS
Perylene-d12 (I)	570,998	16.5	40.0	-6.2	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	40,587	3.36	11.3	45.0	250	18.0	m FAIL
Phenol-d5 (surr)	0.00	3.94	0.00	0.0	250	0.00	m FAIL
2,4,6-Tribromophenol (surr)	107,606	7.68	73.8	295.2	250	118	FAIL

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	: 1221-831-002 R2
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200464.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 18:42:19
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	1221-831-002 R2
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200464.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 18:42:19
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	125,523	4.34	40.0	-11.8	PASS
Naphthalene-d8 (I)	493,965	5.41	40.0	-6.5	PASS
Acenaphthene-d10 (I)	284,268	6.98	40.0	-5.7	PASS
Phenanthrene-d10 (I)	577,371	8.32	40.0	-3.4	PASS
Chrysene-d12 (I)	593,165	12.4	40.0	0.8	PASS
Perylene-d12 (I)	606,147	16.5	40.0	-0.4	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	25,680	3.35	6.84	27.4	250	10.9	m FAIL
Phenol-d5 (surr)	0.00	3.93	0.00	0.0	250	0.00	m FAIL
2,4,6-Tribromophenol (surr)	104,478	7.68	70.3	281.3	250	113	FAIL

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name : 1221-831-002 R2 (conf)
Sample Info : 0322-012; IS SVOAPrep446
Data File : W2200465.D
Dilution : 1
Extract Volume : 4.00
Acquisition Date : 2022-03-07 19:15:09
Instrument Method : RXI-M8270V1.M
Matrix : LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	1221-831-002 R2 (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200465.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 19:15:09
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	128,503	4.34	40.0	-9.7	PASS
Naphthalene-d8 (I)	497,396	5.42	40.0	-5.8	PASS
Acenaphthene-d10 (I)	287,551	6.98	40.0	-4.6	PASS
Phenanthrene-d10 (I)	585,290	8.32	40.0	-2.1	PASS
Chrysene-d12 (I)	595,240	12.4	40.0	1.2	PASS
Perylene-d12 (I)	606,256	16.5	40.0	-0.4	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	24,160	3.35	6.29	25.1	250	10.1	m FAIL
Phenol-d5 (surr)	0.00	3.93	0.00	0.0	250	0.00	m FAIL
2,4,6-Tribromophenol (surr)	102,456	7.68	68.0	272.1	250	109	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	:	1221-831-003 R3
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200466.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 19:48:09
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	1221-831-003 R3
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200466.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 19:48:09
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	126,913	4.34	40.0	-10.8	PASS
Naphthalene-d8 (I)	476,943	5.42	40.0	-9.7	PASS
Acenaphthene-d10 (I)	279,192	6.98	40.0	-7.4	PASS
Phenanthrene-d10 (I)	567,038	8.32	40.0	-5.2	PASS
Chrysene-d12 (I)	563,397	12.4	40.0	-4.2	PASS
Perylene-d12 (I)	567,196	16.5	40.0	-6.8	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	29,896	3.35	7.88	31.5	250	12.6	m FAIL
Phenol-d5 (surr)	0.00	3.94	0.00	0.0	250	0.00	m FAIL
2,4,6-Tribromophenol (surr)	111,357	7.69	76.3	305.3	250	122	FAIL

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	: 1221-831-003 R3 (conf)
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200467.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 20:20:56
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	1221-831-003 R3 (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200467.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 20:20:56
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	126,124	4.34	40.0	-11.4	PASS
Naphthalene-d8 (I)	472,898	5.42	40.0	-10.5	PASS
Acenaphthene-d10 (I)	275,227	6.98	40.0	-8.7	PASS
Phenanthrene-d10 (I)	566,865	8.32	40.0	-5.2	PASS
Chrysene-d12 (I)	583,898	12.4	40.0	-0.8	PASS
Perylene-d12 (I)	580,938	16.5	40.0	-4.6	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery		Flag *
2-Fluorophenol (surr)	30,584	3.35	8.11	32.4	250	13.0		FAIL
Phenol-d5 (surr)	0.00	3.94	0.00	0.0	250	0.00	m	FAIL
2,4,6-Tribromophenol (surr)	114,397	7.69	78.4	313.7	250	125		FAIL

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	:	1221-831-004 FPB
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200468.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 20:53:49
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	: 1221-831-004 FPB
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200468.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 20:53:49
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	137,545	4.34	40.0	-3.4	PASS
Naphthalene-d8 (I)	541,096	5.41	40.0	2.4	PASS
Acenaphthene-d10 (I)	311,813	6.98	40.0	3.4	PASS
Phenanthrene-d10 (I)	641,086	8.32	40.0	7.2	PASS
Chrysene-d12 (I)	609,085	12.4	40.0	3.5	PASS
Perylene-d12 (I)	587,013	16.5	40.0	-3.6	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	6,528	3.35	1.59	6.3	250	2.54	m FAIL
Phenol-d5 (surr)	33,940	3.98	6.67	26.7	250	10.7	FAIL
2,4,6-Tribromophenol (surr)	108,538	7.68	65.8	263.2	250	105	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	:	1221-831-004 FPB (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200469.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 21:26:41
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	: 1221-831-004 FPB (conf)
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200469.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 21:26:41
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	124,073	4.34	40.0	-12.8	PASS
Naphthalene-d8 (I)	483,451	5.41	40.0	-8.5	PASS
Acenaphthene-d10 (I)	285,132	6.98	40.0	-5.4	PASS
Phenanthrene-d10 (I)	577,804	8.32	40.0	-3.4	PASS
Chrysene-d12 (I)	570,701	12.4	40.0	-3.0	PASS
Perylene-d12 (I)	533,825	16.5	40.0	-12.3	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	6,530	3.35	1.76	7.0	250	2.82	FAIL
Phenol-d5 (surr)	32,246	3.98	7.02	28.1	250	11.2	FAIL
2,4,6-Tribromophenol (surr)	102,006	7.68	68.6	274.4	250	110	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Company	Enthalpy Ultratrace Wilmington		Client #	006AS-011833
Analyst	DBS		Job #	0322-012
Parameters	GC/MS SVOA Scan		# Samples	4 Samples

Sample ID: **1221-831-001 R1**
Data File: W2200462.D
Tank/Misc ID: 0322-012; IS SVOAPrep446

DF: 1.00
Final Volume (mL): 4.00

Compound	**CAS#**	**MW**	**Ret. Time (min)**	**Area**	**Conc. (ug/mL)**	**Sample Catch (ug)**
Hexamethylcyclotrisiloxane	000541-05-9	222	2.95	2,644,840	56.5	226
Decamethylcyclopentasiloxane	000541-02-6	370	4.86	2,615,680	55.9	224

Operator's Assessments

Compound	**CAS#**	**MW**	**Ret. Time (min)**	**Area**	**Conc. (ug/mL)**	**Sample Catch (ug)**
Unknown C8 or greater Hydrocarbon		126	3.11	3,049,890	65.2	261
Ethylbenzene	000100-41-4	106	3.35	5,588,493	119	478
Xylene isomer		106	3.40	3,771,101	80.6	322
Octamethylcyclotetrasiloxane	0005569-67-2	296	3.94	12,479,895	267	1,066
Trimethylbenzene isomer		120	4.20	2,156,890	46.1	184
Dimethylphenol isomer		122	5.15	3,864,400	119	477
Benzoic acid	000065-85-0	122	5.22	16,886,058	521	2,084
1,4-Benzenedicarboxaldehyde / Ethylbenzaldehyde *	000623-27-8 / 053951-50-1	134 / 134	5.33	1,408,610	43.5	174
Dimethylethylbenzenediol isomer		166	6.91	4,794,650	134	537

* Compounds Co-elute

Company	Enthalpy Ultratrace Wilmington		Client #	006AS-011833
Analyst	DBS		Job #	0322-012
Parameters	GC/MS SVOA Scan		# Samples	4 Samples

Sample ID: **1221-831-002 R2**
Data File: W2200464.D
Tank/Misc ID: 0322-012; IS SVOAPrep446

DF: 1.00
Final Volume (mL): 4.00

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Benzoic Acid	000065-85-0	122	5.22	24,876,743	571	2,284

Operator's Assessments

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Unknown C8 or greater Hydrocarbon		126	3.08	2,601,160	71.2	285
Ethylbenzene	000100-41-4	106	3.33	9,705,945	265	1,062
Xylene isomer		106	3.39	9,817,075	269	1,074
Trimethylbenzene isomer		120	4.02	2,571,810	70.4	281
Trimethylbenzene isomer		120	4.20	5,334,940	146	584
Dimethylethylbenzenediol isomer		166	6.92	5,177,280	123	492
Methoxyphenoxybenzene isomer /	/	200/				
Unknown Hydrocarbon *			7.90	4,155,860	98.1	392
Unknown pyridine compound			7.94	4,266,450	101	403
Unknown compound			19.89	2,371,410	56.8	227

* Compounds Co-elute

Company	Enthalpy Ultratrace Wilmington		Client #	006AS-011833
Analyst	DBS		Job #	0322-012
Parameters	GC/MS SVOA Scan		# Samples	4 Samples

Sample ID: **1221-831-003 R3**
Data File: W2200466.D
Tank/Misc ID: 0322-012; IS SVOAPrep446

DF: 1.00
Final Volume (mL): 4.00

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Benzoic Acid	000065-85-0	122	5.26	22,442,692	461	1,843

Operator's Assessments

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Unknown C8 compound		126	3.08	2,947,370	76.5	306
Ethylbenzene	000100-41-4	106	3.33	9,781,863	254	1,015
Xylene isomer		106	3.39	8,745,285	227	907
Octamethylcyclotetrasiloxane	0005569-67-2	296	3.94	10,599,430	275	1,100
Trimethylbenzene isomer		120	4.03	2,600,960	67.5	270
Trimethylbenzene isomer		120	4.20	4,805,450	125	499
Dimethylphenol isomer		122	5.15	3,938,970	80.9	324
Dimethylethylbenzenediol isomer		166	6.92	5,879,270	132	530
Methoxyphenoxybenzene isomer / Unknown Hydrocarbon *	/	200/	7.90	2,027,530	48.4	194

* Compounds Co-elute

Company	Enthalpy Ultratrace Wilmington		Client #	006AS-011833
Analyst	DBS		Job #	0322-012
Parameters	GC/MS SVOA Scan		# Samples	4 Samples

Sample ID: **1221-831-004 FPB**
Data File: W2200468.D
Tank/Misc ID: 0322-012; IS SVOAPrep446

DF: 1.00
Final Volume (mL): 4.00

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
4-Ethylbenzoyl chloride	000937-30-4	48	6.81	458,046	12.4	49.6

Operator's Assessments

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Ethylbenzene	000100-41-4	106	3.33	2,986,074	133	530
Xylene isomer		106	3.39	2,030,014	90.1	360
2,4,6-Trimethylheptane	002613-61-8	142	3.65	301,958	13.4	53.6
Ethylmethylcyclohexane isomer / Tetrachloroethane isomer		126 / 166	3.69	1,483,240	65.8	263
Propylcyclohexane / Butylcylopentane	001678-92-8 / 002040-95-1	126 / 126	3.81	770,082	34.2	137
Methylpropenylbenzene isomer		132	4.75	449,950	20.0	79.9
Dimethylbenzaldehyde isomer / Diethylbenzene isomer *		134 / 134	5.23	808,534	27.0	108
1,4-Benzenedicarboxaldehyde / Ethylbenzaldehyde *	000623-27-8 / 053951-50-1	134 / 134	5.33	943,773	31.5	126
4-Cyanophenyl-4-ethylbenzoic acid	056131-48-7	251	6.67	523,788	14.2	56.7

* Compounds Co-elute

Lab QC

Sample Name	:	MB
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200460.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 16:30:46
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	: MB
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200460.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 16:30:46
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	143,313	4.34	40.0	0.7	PASS
Naphthalene-d8 (I)	550,104	5.41	40.0	4.1	PASS
Acenaphthene-d10 (I)	323,303	6.98	40.0	7.2	PASS
Phenanthrene-d10 (I)	634,825	8.32	40.0	6.2	PASS
Chrysene-d12 (I)	658,590	12.4	40.0	11.9	PASS
Perylene-d12 (I)	626,244	16.5	40.0	2.9	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	10,820	3.35	2.52	10.1	250	4.04	m FAIL
Phenol-d5 (surr)	49,865	3.98	9.40	37.6	250	15.0	m FAIL
2,4,6-Tribromophenol (surr)	83,326	7.68	51.0	204.0	250	81.6	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	:	MB (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200461.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 17:03:39
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.425	ND	
1,3-Dichlorobenzene	0.142	ND	0.566	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.940	ND	
1,2-Dichlorobenzene	0.268	ND	1.07	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.835	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.720	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.842	ND	
2,4,5-Trichlorophenol	0.251	ND	1.00	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	1.37	ND	
Hexachlorobenzene	0.321	ND	1.28	ND	
Pentachlorophenol (CCC)	0.223	ND	0.894	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	: MB (conf)
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200461.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 17:03:39
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	134,925	4.34	40.0	-5.2	PASS
Naphthalene-d8 (I)	506,391	5.41	40.0	-4.1	PASS
Acenaphthene-d10 (I)	298,378	6.98	40.0	-1.0	PASS
Phenanthrene-d10 (I)	605,698	8.32	40.0	1.3	PASS
Chrysene-d12 (I)	587,322	12.4	40.0	-0.2	PASS
Perylene-d12 (I)	555,447	16.5	40.0	-8.8	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	10,817	3.35	2.68	10.7	250	4.29	m FAIL
Phenol-d5 (surr)	47,697	3.98	9.55	38.2	250	15.3	m FAIL
2,4,6-Tribromophenol (surr)	84,267	7.68	54.1	216.3	250	86.5	PASS

*** (m) = Manual Integration**

IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	: DCM Blank
Sample Info	: Lot 220212
Data File	: W2200453.D
Dilution	: 1
Extract Volume	: 1.00
Acquisition Date	: 2022-03-07 12:40:50
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	ND	0.106	ND	
1,3-Dichlorobenzene	0.142	ND	0.142	ND	
1,4-Dichlorobenzene (CCC)	0.235	ND	0.235	ND	
1,2-Dichlorobenzene	0.268	ND	0.268	ND	
2,4-Dichlorophenol (CCC)	0.209	ND	0.209	ND	
1,2,4-Trichlorobenzene	0.180	ND	0.180	ND	
2,4,6-Trichlorophenol (CCC)	0.211	ND	0.211	ND	
2,4,5-Trichlorophenol	0.251	ND	0.251	ND	
2,3,4,6-Tetrachlorophenol	0.342	ND	0.342	ND	
Hexachlorobenzene	0.321	ND	0.321	ND	
Pentachlorophenol (CCC)	0.223	ND	0.223	ND	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	: DCM Blank
Sample Info	: Lot 220212
Data File	: W2200453.D
Dilution	: 1
Extract Volume	: 1.00
Acquisition Date	: 2022-03-07 12:40:50
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Internal Standards	**Response**	**Retention Time (min)**	**Concentration (ug/mL)**	**% Deviation**	**Flag ***
1,4-Dichlorobenzene-d4 (I)	127,562	4.34	40.0	-10.4	PASS
Naphthalene-d8 (I)	472,970	5.41	40.0	-10.5	PASS
Acenaphthene-d10 (I)	270,267	6.97	40.0	-10.3	PASS
Phenanthrene-d10 (I)	524,614	8.32	40.0	-12.3	PASS
Chrysene-d12 (I)	532,193	12.4	40.0	-9.6	PASS
Perylene-d12 (I)	536,277	16.5	40.0	-11.9	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	: LCS
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200458.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 15:24:57
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	32.2	0.425	129	
1,3-Dichlorobenzene	0.142	39.5	0.566	158	
1,4-Dichlorobenzene (CCC)	0.235	38.7	0.940	155	
1,2-Dichlorobenzene	0.268	41.7	1.07	167	
2,4-Dichlorophenol (CCC)	0.209	51.6	0.835	206	
1,2,4-Trichlorobenzene	0.180	52.2	0.720	209	
2,4,6-Trichlorophenol (CCC)	0.211	58.2	0.842	233	
2,4,5-Trichlorophenol	0.251	57.6	1.00	230	
2,3,4,6-Tetrachlorophenol	0.342	59.4	1.37	238	
Hexachlorobenzene	0.321	56.5	1.28	226	
Pentachlorophenol (CCC)	0.223	59.9	0.894	240	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	: LCS
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200458.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 15:24:57
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	138,686	4.34	40.0	-2.6	PASS
Naphthalene-d8 (I)	529,354	5.41	40.0	0.2	PASS
Acenaphthene-d10 (I)	307,063	6.98	40.0	1.9	PASS
Phenanthrene-d10 (I)	618,543	8.32	40.0	3.5	PASS
Chrysene-d12 (I)	614,801	12.4	40.0	4.5	PASS
Perylene-d12 (I)	569,425	16.5	40.0	-6.5	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	27,544	3.34	6.64	26.6	250	10.6	m FAIL
Phenol-d5 (surr)	78,759	3.98	15.3	61.4	250	24.5	m PASS
2,4,6-Tribromophenol (surr)	103,327	7.68	64.9	259.7	250	104	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	:	LCS
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200458.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 15:24:57
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	Response	Concentration (ug/mL)	Tag Value (ug/mL)	% Recovery	Flag
2-Chlorophenol	137,529	32.2	62.5	51.5	PASS
1,3-Dichlorobenzene	195,414	39.5	62.5	63.2	PASS
1,4-Dichlorobenzene (CCC)	198,128	38.7	62.5	61.8	PASS
1,2-Dichlorobenzene	200,830	41.7	62.5	66.7	PASS
2,4-Dichlorophenol (CCC)	199,664	51.6	62.5	82.6	PASS
1,2,4-Trichlorobenzene	229,021	52.2	62.5	83.4	PASS
2,4,6-Trichlorophenol (CCC)	183,251	58.2	62.5	93.0	PASS
2,4,5-Trichlorophenol	201,579	57.6	62.5	92.1	PASS
2,3,4,6-Tetrachlorophenol	165,215	59.4	62.5	95.1	PASS
Hexachlorobenzene	214,426	56.5	62.5	90.4	PASS
Pentachlorophenol (CCC)	128,308	59.9	62.5	95.8	PASS

Sample Name	:	LCS (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200459.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 15:57:48
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Target Compound	MDL (ug/mL)	Concentration (ug/mL)	MDL (ug)	Catch Weight (ug)	Flag *
2-Chlorophenol	0.106	34.1	0.425	137	
1,3-Dichlorobenzene	0.142	40.5	0.566	162	
1,4-Dichlorobenzene (CCC)	0.235	40.0	0.940	160	
1,2-Dichlorobenzene	0.268	42.6	1.07	170	
2,4-Dichlorophenol (CCC)	0.209	53.4	0.835	214	
1,2,4-Trichlorobenzene	0.180	53.5	0.720	214	
2,4,6-Trichlorophenol (CCC)	0.211	60.3	0.842	241	
2,4,5-Trichlorophenol	0.251	58.9	1.00	236	
2,3,4,6-Tetrachlorophenol	0.342	64.9	1.37	260	
Hexachlorobenzene	0.321	60.3	1.28	241	
Pentachlorophenol (CCC)	0.223	67.3	0.894	269	

(ND) = Not Detected
*** (J) = Below Calibration Range, (E) = Above Calibration Range, (m) = Manual Integration**

Sample Name	:	LCS (conf)
Sample Info	:	0322-012; IS SVOAPrep446
Data File	:	W2200459.D
Dilution	:	1
Extract Volume	:	4.00
Acquisition Date	:	2022-03-07 15:57:48
Instrument Method	:	RXI-M8270V1.M
Matrix	:	LIQUID

Internal Standards	Response	Retention Time (min)	Concentration (ug/mL)	% Deviation	Flag *
1,4-Dichlorobenzene-d4 (I)	138,842	4.34	40.0	-2.4	PASS
Naphthalene-d8 (I)	512,952	5.41	40.0	-2.9	PASS
Acenaphthene-d10 (I)	290,498	6.98	40.0	-3.6	PASS
Phenanthrene-d10 (I)	595,143	8.32	40.0	-0.5	PASS
Chrysene-d12 (I)	614,900	12.4	40.0	4.5	PASS
Perylene-d12 (I)	600,964	16.5	40.0	-1.3	PASS

Surrogates	Response	Retention Time (min)	Concentration (ug/mL)	Catch (ug)	Tag Value (ug)	% Recovery	Flag *
2-Fluorophenol (surr)	30,614	3.34	7.37	29.5	250	11.8	m FAIL
Phenol-d5 (surr)	79,109	3.98	15.4	61.6	250	24.6	m PASS
2,4,6-Tribromophenol (surr)	101,540	7.68	66.3	265.2	250	106	PASS

*** (m) = Manual Integration**
IS Acceptance Criteria: RT +/- 20 sec, Response +/- 40%

Sample Name	: LCS (conf)
Sample Info	: 0322-012; IS SVOAPrep446
Data File	: W2200459.D
Dilution	: 1
Extract Volume	: 4.00
Acquisition Date	: 2022-03-07 15:57:48
Instrument Method	: RXI-M8270V1.M
Matrix	: LIQUID

Target Compound	Response	Concentration (ug/mL)	Tag Value (ug/mL)	% Recovery	Flag
2-Chlorophenol	146,019	34.1	62.5	54.6	PASS
1,3-Dichlorobenzene	200,516	40.5	62.5	64.8	PASS
1,4-Dichlorobenzene (CCC)	205,505	40.0	62.5	64.1	PASS
1,2-Dichlorobenzene	205,379	42.6	62.5	68.2	PASS
2,4-Dichlorophenol (CCC)	200,164	53.4	62.5	85.5	PASS
1,2,4-Trichlorobenzene	227,740	53.5	62.5	85.6	PASS
2,4,6-Trichlorophenol (CCC)	179,871	60.3	62.5	96.5	PASS
2,4,5-Trichlorophenol	195,168	58.9	62.5	94.3	PASS
2,3,4,6-Tetrachlorophenol	170,718	64.9	62.5	103.9	PASS
Hexachlorobenzene	220,394	60.3	62.5	96.6	PASS
Pentachlorophenol (CCC)	138,782	67.3	62.5	107.7	PASS

Company	Enthalpy Ultratrace Wilmington
Analyst	DBS
Parameters	GC/MS SVOA Scan

Client #	006AS-011833
Job #	0322-012
# Samples	4 Samples

Sample ID: **MB**
Data File: W2200460.D
Tank/Misc ID: 0322-012; IS SVOAPrep446

DF: 1.00
Final Volume (mL): 4.00

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Benzyl Alcohol	000100-51-6	108	4.41	741,218	31.4	126

Operator's Assessments

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
Ethylbenzene	000100-41-4	106	3.32	4,632,829	196	785
Xylene isomer		106	3.39	3,207,269	136	544
1,1,2,2-Tetrachloroethane / Ethylmethylcyclohexane isomer *	000079-34-5 /	166 / 126	3.69	1,871,500	79.3	317
Unknown C8 or greater compound			3.82	1,002,250	42.5	170
Bromocyclohexane	000108-85-0	162	3.97	2,483,718	105	421
Benzaldehyde	000100-52-7	106	4.00	1,400,397	59.3	237
Unknown C8 or greater compound		106	5.09	1,551,170	52.3	209
1,4-Benzenedicarboxaldehyde / Diethylbenzene isomer *	000623-27-8 /	134 / 134	5.23	1,080,050	36.4	146
3-Methylbenzofuran / Ethylbenzaldehyde *	1000190-15-5 / 053951-50-1	132 / 134	5.33	1,198,710	40.4	162

* Compounds Co-elute

Company	Enthalpy Ultratrace Wilmington		Client #	006AS-011833
			Job #	0322-012
Analyst	DBS		# Samples	4 Samples
Parameters	GC/MS SVOA Scan			

Sample ID: **DCM Blank**
Data File: W2200453.D
Tank/Misc ID: Lot 220212

DF: 1.00
Final Volume (mL): 1.00

Compound	CAS#	MW	Ret. Time (min)	Area	Conc. (ug/mL)	Sample Catch (ug)
None Detected						

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Enthalpy Analytical - Ultratrace
Analyst	DBS
Parameters	EPA Method 8270D & TICs

Client #	006AS-011833
Job #	0322-012
# Samples	4 Samples

Custody

The samples were received at Enthalpy Analytical's Wilmington laboratory on 2/1/22 at 10.6°C after being relinquished by Montrose Air Quality Services, LLC - Portland. The extracts were received at Enthalpy's Durham laboratory on 2/28/22 by Bryan Tyler and logged in by Alyssa Miller on 3/1/22. All sample extracts were received at 0.7ºC upon log in and were in good condition.

Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, LLC.

Analysis

The samples were analyzed for a client requested target compound list and top ten tentatively identified compounds using the analytical procedures in EPA Method 8270D; *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry*.

Each sample was soxhlet extracted for 16 hours in hexane followed by a 16-hour soxhlet extraction in toluene. The soxhlet extracts were combined, split in a one-to-four ratio, solvent exchanged into methylene chloride then concentrated to a 1mL final volume. To reflect the extract split during sample preparation all samples will display a final volume of 4 mLs.

The field samples and QC samples were prepared for analysis by spiking a 100-uL aliquot of sample with 5 uL of SV IS (internal standard) solution resulting in an internal standard concentration of 40 ug.

The Agilent Technologies Model 6890N, Gas Chromatograph "Wiley" (S/N CN10244010) was equipped with a 5973N Mass Selective Detector (S/N US21844806) for these analyses.

Calibration

The DFTPP tune analyses associated with the initial and continuing calibrations met acceptance criteria.

The initial calibration (*W022822A-M8270*) met 20% RSD or greater than 0.99 coefficient of determination (R^2) acceptance criteria. Minimum RF criteria were met for the compounds. The initial

Calibration (continued)	calibration verification met the 70-130% recovery criteria. The continuing calibration met the 20% RSD criteria. Calibration data has not been included in this Level 2 report but is available upon request.
Chromatographic Conditions	The acquisition method (***RXI-M8270V1.m***) has not been included in this report, but may be made available upon request.
QC Notes	All internal standard criteria were met for this data set. The surrogates did not meet the recovery criteria. All surrogates failed recovery criteria for samples ***1221-0831-001 R1, 1221-0831-002 R2,*** and ***1221-0831-003 R3.*** 2,4,6-Tribromophenol met the surrogate recovery criteria in samples ***1221-831-004 FPB, LCS*** and ***MB***. Phenol-d5 also met recovery criteria in the ***LCS***. No target analytes were detected in the analysis of the laboratory system blank at concentrations greater than the limit of quantitation (LOQ). No target analytes were detected in the analysis of the method blank (MB) at concentrations greater than the limit of quantitation. Several tentatively identified compounds were present in the method blank at concentrations greater than 1.0ug/mL. The Laboratory Duplicate (LD) associated with this sample data set met less than 20% difference. The Laboratory Control Sample (LCS) met the 50-150% recovery criteria. All samples were extracted outside the 14-day hold time. All sample extracts were analyzed within the 40-day holding time required by the method.
Reporting Notes	These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above. The results presented in this report are representative of the samples as provided to the laboratory.

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General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC data reports, unless specifically noted otherwise.

- Any analysis which refers to the method as ***"Type"*** represents a planned deviation from the reference method. For instance a Hydrogen Sulfide assay from a Tedlar bag would be labeled as "EPA Method 16-Type" because Tedlar bags are not mentioned as one of the collection options in EPA Method 16.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.

- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.

- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.

- The letter ***J*** in the Qualifier or Flag column in the results indicates that the value is between the MDL and the LOQ. The laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.

- The letter ***E*** in the Qualifier or Flag column indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.

- Sample results are presented 'as measured' for single injection methodologies, or an average value if multiple injections are made. If all injections are below the MDL, the sample is considered non-detect and the ND value is presented. If one, but not all, are below the MDL, the MDL value is used for any injections that are below the MDL. For example, if the MDL is 0.500 and LOQ is 1.00, and the instrument measures 0.355, 0.620, and 0.442 - the result reported is the average of 0.500, 0.620, and 0.500 - - - i.e. 0.540 with a J flag.

- When a spike recovery (Bag Spike, Collocated Spike Train, or liquid matrix spike) is being calculated, the native (unspiked) sample result is used in the calculations, as long as the value is above the MDL. If a sample is ND, then 0 is used as the native amount (not the MDL value).

- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.

- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. The MS analysis indicates what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).

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General Reporting Notes
(continued)

- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as a MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.

- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).

- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.

- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two spikes are retained as LCSs. The LCSs are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection, and/or sample transport.

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits. In the case of small numbers, generally 3 significant figures are presented, but still only 2 should be used with confidence. Many neat materials are only certified to 3 digits, and as the mathematically correct final result is always 1 digit less than all its pre-cursors - 2 significant figures are what are most defensible.

- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations on sample chromatograms, if provided in the report. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name on the chromatogram.

ENTHALPY
ANALYTICAL

Sample Custody

ENTHALPY
ANALYTICAL

MONTROSE AIR QUALITY SERVICES

CHAIN OF COUSTODY

(Acetone/Toluene Rinses) Fedex, 7759 2882 0134, cooler, on ice, no seals, good condition DK 2/2/22 11:15 4.2° T9

1221-831

Portland Location (Impinger Rinses) Fedex, 7759 2881 9840, cooler, on ice, no seals, good condition DK 2/2/22 11:15 3.7° T9
13585 NE Whitaker Way
Portland, OR 97230 (Traps / Filters)
Phone (503) 255-5050 | Fax (503) 255-0505 Fedex, 7759 1713 7497, cooler, blue ice, no seals, good condition

Lab info: Enthalpy

DK 2/1/22

Client / Project: Ecolube	**Project / Sample Location:** RTO #1 Outlet	**Test / Analytical Method:** Revised Method 23 per Enthalpy SOPs
Project No.: 006AS-011833	**Purchase Order No:**	**Special Analysis / Detection Limit / Reporting Instructions:**
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com jheffernan@montrose-env.com	**Sampler or PM Signature:**	Each dioxin&furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners, plus each PCB congener and PAH and PAN-deriviative listed. Chlorobenzene and chlorophenol. List is attached to this COC.

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
R1 Filter	1/26/22	1845	1			Cooler
R1 Ace & Tolu	1/26/22	1845	1		Acetone and Toluene	
R1 XAD Trap	1/26/22	1845	1			Cooler
R1 Imp Cont & Rinse	1/26/22	1845	1		H2O, Acetone and Toluene	
R2 Filter	1/27/22	1345	1			Cooler
R2 Ace & Tolu	1/27/22	1345	1		Acetone and Toluene	
R2 XAD Trap	1/27/22	1345	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
R3 Filter	1/27/22	1910	2			Cooler
R3 Ace & Tolu	1/27/22	1910	1		Acetone and Toluene	
R3 XAD Trap	1/27/22	1910	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
FPB Filter	1/27/22	1920	1			Cooler
FPB Ace & Tolu	1/27/22	1920	1		Acetone and Toluene	
FPB XAD Trap	1/27/22	1920	1			Cooler
FPB Imp Cont & Rinse	1/27/22	1920	1		H2O, Acetone and Toluene	
Total Containers			17			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
[signature]	1/31/22	1111	[signature]	2/1/22	11:30	10.6° T9
Olivia Kyger	2/25/22	1130	[signature] 2/28/22	~~3/1/22~~ 3/1	1600	-20 freezer
[signature]	3/1/22	850	Alyson M Miller	03-01-22	0900	0.7

Key: PCDD = Polychlorinated Dibenzo-p-Dioxin, PCDF = Polychlorinated Dibenzofuran, FB = Field Blank, RB = Reagent Blank

0.7°C Paytek 2, good condition 3.1.22

MAQS Chain of Custody Macro-R4

MONTROSE
AIR QUALITY SERVICES
Portland Location (Impinger Rinses) Fedex, 7759 2881 9840, Cooler, 2 on ice, no seals, good condition OK 2/2/22 11:15 3.7°T9
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050 | Fax (503) 255-0505

(Traps / Filters) Fedex, 7759 1713 7497, cooler, blue ice, no seals, good condition

CHAIN OF CUSTODY

1221-831

(Acetone/Toluene Rinses) Fedex, 7759 2882 0134, cooler, on ice, no seals, good condition OK 2/2/22 11:15 4.2° T9

Lab info: Enthalpy

OK 2/1/22

Client / Project: Ecolube	**Project / Sample Location:** RTO #1 Outlet	**Test / Analytical Method:** Revised Method 23 per Enthalpy SOPs
Project No.: 006AS-011833	**Purchase Order No:**	**Special Analysis / Detection Limit / Reporting Instructions:** Each dioxin&furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners, plus each PCB congener and PAH and PAN-deriviative listed. Chlorobenzene and chlorophenol. List is attached to this COC.
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com jheffernan@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
R1 Filter	1/26/22	1845	1			Cooler
R1 Ace & Tolu	1/26/22	1845	1		Acetone and Toluene	
R1 XAD Trap	1/26/22	1845	1			Cooler
R1 Imp Cont & Rinse	1/26/22	1845	1		H2O, Acetone and Toluene	
R2 Filter	1/27/22	1345	1			Cooler
R2 Ace & Tolu	1/27/22	1345	1		Acetone and Toluene	
R2 XAD Trap	1/27/22	1345	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
R3 Filter	1/27/22	1910	2			Cooler
R3 Ace & Tolu	1/27/22	1910	1		Acetone and Toluene	
R3 XAD Trap	1/27/22	1910	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
FPB Filter	1/27/22	1920	1			Cooler
FPB Ace & Tolu	1/27/22	1920	1		Acetone and Toluene	
FPB XAD Trap	1/27/22	1920	1			Cooler
FPB Imp Cont & Rinse	1/27/22	1920	1		H2O, Acetone and Toluene	
Total Containers			17			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
[illegible signature]	1/21/22	1111	[illegible signature]	2/1/22	11:30	10.6° T9
[illegible signature]	2/25/22	1130	[illegible signature] 2/28/22	~~3/1/22~~ 3/1	1600	-20 freezer
[illegible signature]	3/1/22	850	Alison M Miller	03 01-22	0900	0.7

Key: PCDD = Polychlorinated Dibenzo-p-Dioxin, PCDF = Polychlorinated Dibenzofuran, FB = Field Blank, RB = Reagent Blank

0.7°C Raytek 2, good condition [illegible] 3.01.22

MAQS Chain of Custody Macro-R4

Matrix: air	Batch #: 13049		Extraction Cycle Times
Extraction Type: ☐SDS ☐SPE ☐Liq-Liq ☐SEP		Init. / Date	
☑PCDD/F ☑PCB ☑PAH	Extraction	OK/B 2/22/22	Start: 1:40 Stop: 9:00 Start Date: 2/22/22 HEX
☐Other:	Clean Up	OK/B 2/24/22	Start: 2:30 Stop: 9:00 Start Date: 2/23/22 TOL
	Transfer	OK/B 2/24/22	Start: — Stop: — Start Date: —
			Split: (1/2) (1/4) (*)Final Volume: 20 µL — DF PCB/PAH — 100 uL

Lab Sample ID	QC Type	Wt. (g)/(Vol. (mL))	Extr. Pos.#	Observations	pH
1221-831_13049_001	--------	443.9 —	3	—	1
1221-831_13049_002	--------	412.5 —	4	—	1
1221-831_13049_003	--------	420.7 —	5	—	1
1221-831_13049_004	--------	258.4 —	6	—	1
MB_13049_DF/PCB/PAH	--------	—	1	—	5
LCS_13049_DF/PCB/PAH	--------	—	2	—	n/a
BCS_13049_DF	--------	—	—	—	n/a
BCS_13049_PCB	--------	—	—	—	n/a
BCS_13049_PAH	--------	—	—	—	n/a
	--------				n/a

OK 2/24/22

MS Parent Sample (if used)
—

Supply IDs

Item	Supplier	Lot/Prep ID
Toluene	Fisher	216931
Acid Silica	—	EUPrep 2-12-1
Base Silica	—	EUPrep 2-11-8
Silica	Acros	A0391958
Florisil	Sigma	57209
Hexane	Fisher	213778
CH_2Cl_2	Fisher	214276
Tetradecane	—	STBK2282
Na_2SO_4	Merck	17B155209
$AgNO_3$	—	EUPrep 2-22-7
Hydromatrix	—	—
H2SO4	—	—

Supply IDs (Continued)

Item	Supplier	Lot/ Prep ID
Cl Strips	—	—
pH Strips	Merck	HC157843
Sox filter	Millipore	R1EB97823
Glass wool	—	14721999
—	—	—

Comments:
(*) Note: M0010 FV=1000uL
B 2/24/22

Equipment IDs

Balance	1
Pipettes	P25, P18, P16

OK 2/26/22

Reviewer Initials / Date: ____________________

Air Sample Fraction Observations				ENTHALPY ANALYTICAL
		Init.	Date	
Extraction Prep:	13049	OK	2/22/22	

Lab Sample ID	XAD	Filter(s)	Rinses	Glasswool	Other
1221-831-001	YW on top, S	BK, B	BK PM	WH, W	—
1221-831-002	YW on top, S	BK	BK PM	WH, W	—
1221-831-003	WH, S	BK, B	BK PM	WH, W	—
1221-831-004	WH, F	WH, C	BK PM	WH, D	—

OK 2/22/22

COMMON OBSERVATION ABBREVIATIONS
B = BULLSEYE
BE = BEIGE
BK = BLACK
C = CLEAN
D = DRY
F = FREE FLOWING
GY = GREY
M = MOIST
PM = PARTICULATES
S = STICKY
W = WET
WH = WHITE
YW = YELLOW

Comments:
Note: All samples have a fuel smell. B 2/22/22

1221-831_**MB**
MAQS-Portland, OR
Prep Date: 01/05/2022
DF/PAH/PCB

Alicia Kygar 2/22/22

Reviewer Initials / Date: ____________

EU083_v1 (Air Sample Observations)

Spike Profile Sheet

ENTHALPY ANALYTICAL

Batch#: 13049

Comments: ~~Bn 2/25/22~~

NOTE: ALL Ax STANDARDS SOLUTIONS ARE ONLY SPIKED INTO BCS, LCS, OPR AND/OR MS/MSD

PCDD/F

ES: 40 µL @ 100pg/uL	Ax-A: 40 µL @ 10pg/uL	Ax-B: 40 µL @ 10pg/uL	AS: 40 µL @ 100pg/uL
ID: SID0443	ID: SIDAJ57	ID: SIDAK50	ID: SIDAN71
Exp.: AUG 2028	Exp.: APR 2026	Exp.: OCT 2025	Exp.: AUG 2023
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/24/22
~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~
~~CS: µL @~~	JS: 20 µL @ 100pg/uL	~~µL @~~	~~µL @~~
~~ID:~~ Bn	ID: SIDAJ60	~~ID:~~ Bn	~~ID:~~
~~Exp.:~~ 2/22/22	Exp.: APR 2026	~~Exp.:~~ 2/24/22	~~Exp.:~~
~~Spiker:~~	Spiker: Bn 2/24/22	~~Spiker:~~	~~Spiker:~~
~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~

PCB

EE Bn 2/22/22
NS: EE Bn 2/22/22

ES: 10 µL @ 0.5-2.0ng/uL	~~Ax1668/209:~~ IS: 10 µL @ 1 mg/mL		~~CS: µL @~~
ID: SID0596	ID: SID0595		~~ID:~~ Bn
Exp.: 6/21/22	Exp.: 5/14/22		~~Exp.:~~ 2/22/22
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22		~~Spiker:~~
~~Witness: Date:~~	~~Witness: Date:~~		~~Witness: Date:~~
~~JS: µL @~~	~~FS: µL @~~	~~: µL @~~	
~~ID:~~	~~ID:~~ Bn	~~ID:~~	
~~Exp.:~~	~~Exp.:~~ 2/24/22	~~Exp.:~~	
~~Spiker:~~	~~Spiker:~~	~~Spiker:~~	
~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~	

PAH

ES: 80 µL @ 500pg/uL	Ax: 80 µL @ 500pg/uL	AS: 80 µL @ 500pg/uL	~~CS: µL @~~
ID: SIDA051	ID: SIDAK59	ID: SIDAN47	~~ID:~~ Bn
Exp.: NOV 2022	Exp.: MAY 2022	Exp.: JUL 2022	~~Exp.:~~ 2/22/22
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/24/22	~~Spiker:~~
~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~
JS: 80 µL @ 125pg/uL	~~: µL @~~	8270 MegaMix: $\boxed{250uL}$ at 1000ug/mL	8270 Acid surr.: $\boxed{25uL}$ at 10,000ug/mL
ID: SIDAN48	~~ID:~~ Bn	ID: SID0639	ID: SID0628
Exp.: JUL 2022	~~Exp.:~~ 2/24/22	Exp: 3/2023	Exp: 10/2026
Spiker: Bn 2/24/22	~~Spiker:~~	Spiker: Bn 2/22/22	Spiker: Bn 2/22/22
~~Witness: Date:~~	~~Witness: Date:~~		

Reviewer Initials / Date: ______________________

This Is The Last Page Of This Report.

ENTHALPY
ANALYTICAL

March 31, 2022

Vista Work Order No. 2203071

Mr. Mark Hager
Enthalpy Analytical, LLC
2714 Exchange Dr.
Wilmington, NC 28405

Dear Mr. Hager,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 07, 2022 under your Project Name 'Ecolube / RTO #1 Outlet / 006AS-011833'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at jfox@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Jamie Fox
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2203071
Case Narrative

Sample Condition on Receipt:

Seven extracts were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. The extracts were received in good condition and within the method temperature requirements. As requested, the extract for LCS_13049_DF/PCB/PAH was not analyzed.

Analytical Notes:

EPA Method 1668C

These samples were extracted by Enthalpy Analytical - Wilmington Laboratory. The extracts were processed by Vista Analytical Laboratory and analyzed for a selected list of PCB congeners by EPA Method 1668C using a ZB-1 GC column.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and a Laboratory Control Sample (LCS) were prepared by Enthalpy Analytical - Wilmington Laboratory and analyzed by Vista Analytical Laboratory. No analytes were detected in the Method Blank.

Labeled standard recoveries for all QC and field samples were within method acceptance criteria.

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2203071-01	1221-831_13049_001	26-Jan-22 18:45	07-Mar-22 09:45	Clear Ampule
2203071-02	1221-831_13049_002	27-Jan-22 13:45	07-Mar-22 09:45	Clear Ampule
2203071-03	1221-831_13049_003	27-Jan-22 19:10	07-Mar-22 09:45	Clear Ampule
2203071-04	1221-831_13049_004	27-Jan-22 19:20	07-Mar-22 09:45	Clear Ampule
2203071-05	MB_13049_DF/PCB/PAH	22-Feb-22 01:40	07-Mar-22 09:45	Clear Ampule
2203071-06	LCS_13049_DF/PCB/PAH	22-Feb-22 01:40	07-Mar-22 09:45	Clear Ampule
2203071-07	BCS_13049_PCB	22-Feb-22 01:40	07-Mar-22 09:45	Clear Ampule

ANALYTICAL RESULTS

Sample ID: 1221-831_13049_001 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-01	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	26-Jan-22 18:45				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	13800				21-Mar-22 21:57	1
PCB-18	9690				21-Mar-22 21:57	1
PCB-28	7820				21-Mar-22 21:57	1
PCB-44	3320				21-Mar-22 21:57	1
PCB-52/69	3400				21-Mar-22 21:57	1
PCB-66/76	1620				21-Mar-22 21:57	1
PCB-77	173				21-Mar-22 21:57	1
PCB-81	14.5			J	21-Mar-22 21:57	1
PCB-90/101	1570				21-Mar-22 21:57	1
PCB-105	355				21-Mar-22 21:57	1
PCB-106/118	945				21-Mar-22 21:57	1
PCB-114	ND	16.8			21-Mar-22 21:57	1
PCB-123	24.0			J	21-Mar-22 21:57	1
PCB-126	ND	18.4			21-Mar-22 21:57	1
PCB-128/162	83.4			J	21-Mar-22 21:57	1
PCB-138/163/164	581				21-Mar-22 21:57	1
PCB-153	550				21-Mar-22 21:57	1
PCB-156	52.7				21-Mar-22 21:57	1
PCB-157	ND	12.3			21-Mar-22 21:57	1
PCB-167	ND	10.8			21-Mar-22 21:57	1
PCB-169	ND	18.6			21-Mar-22 21:57	1
PCB-170	62.3				21-Mar-22 21:57	1
PCB-180	170				21-Mar-22 21:57	1
PCB-182/187	ND		96.0		21-Mar-22 21:57	1
PCB-189	ND	8.52			21-Mar-22 21:57	1
PCB-195	ND	16.5			21-Mar-22 21:57	1
PCB-206	ND	14.6			21-Mar-22 21:57	1
PCB-209	ND	10.2			21-Mar-22 21:57	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	89.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-28	IS	77.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-32	IS	112	5 - 145		21-Mar-22 21:57	1
13C-PCB-47	IS	86.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-52	IS	87.6	5 - 145		21-Mar-22 21:57	1
13C-PCB-70	IS	93.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-77	IS	88.9	10 - 145		21-Mar-22 21:57	1
13C-PCB-81	IS	91.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-101	IS	86.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-105	IS	86.7	10 - 145		21-Mar-22 21:57	1
13C-PCB-114	IS	85.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-118	IS	96.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-123	IS	101	10 - 145		21-Mar-22 21:57	1
13C-PCB-126	IS	66.4	10 - 145		21-Mar-22 21:57	1
13C-PCB-138	IS	87.8	10 - 145		21-Mar-22 21:57	1
13C-PCB-153	IS	102	10 - 145		21-Mar-22 21:57	1
13C-PCB-156	IS	88.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-157	IS	89.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-159	IS	99.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-167	IS	95.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-169	IS	60.9	10 - 145		21-Mar-22 21:57	1

Sample ID: 1221-831_13049_001 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-01	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	26-Jan-22 18:45				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-170	IS	75.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-180	IS	85.5	10 - 145		21-Mar-22 21:57	1
13C-PCB-188	IS	99.5	10 - 145		21-Mar-22 21:57	1
13C-PCB-189	IS	47.4	10 - 145		21-Mar-22 21:57	1
13C-PCB-194	IS	127	10 - 145		21-Mar-22 21:57	1
13C-PCB-206	IS	109	10 - 145		21-Mar-22 21:57	1
13C-PCB-209	IS	91.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-79	PS	99.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-178	PS	120	10 - 145		21-Mar-22 21:57	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_002 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-02	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 13:45				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	2220				21-Mar-22 22:58	1
PCB-18	965				21-Mar-22 22:58	1
PCB-28	1230				21-Mar-22 22:58	1
PCB-44	265				21-Mar-22 22:58	1
PCB-52/69	346				21-Mar-22 22:58	1
PCB-66/76	167				21-Mar-22 22:58	1
PCB-77	ND		41.1		21-Mar-22 22:58	1
PCB-81	ND	4.68			21-Mar-22 22:58	1
PCB-90/101	181				21-Mar-22 22:58	1
PCB-105	54.6				21-Mar-22 22:58	1
PCB-106/118	ND		115		21-Mar-22 22:58	1
PCB-114	ND	8.18			21-Mar-22 22:58	1
PCB-123	ND	5.89			21-Mar-22 22:58	1
PCB-126	ND	8.47			21-Mar-22 22:58	1
PCB-128/162	ND	12.3			21-Mar-22 22:58	1
PCB-138/163/164	97.1			J	21-Mar-22 22:58	1
PCB-153	76.9				21-Mar-22 22:58	1
PCB-156	ND	10.4			21-Mar-22 22:58	1
PCB-157	ND	11.3			21-Mar-22 22:58	1
PCB-167	ND	10.0			21-Mar-22 22:58	1
PCB-169	ND	14.8			21-Mar-22 22:58	1
PCB-170	ND	12.1			21-Mar-22 22:58	1
PCB-180	54.4				21-Mar-22 22:58	1
PCB-182/187	ND		23.7		21-Mar-22 22:58	1
PCB-189	ND	14.3			21-Mar-22 22:58	1
PCB-195	ND	24.0			21-Mar-22 22:58	1
PCB-206	ND	33.2			21-Mar-22 22:58	1
PCB-209	ND	17.7			21-Mar-22 22:58	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	83.0	5 - 145		21-Mar-22 22:58	1
13C-PCB-28	IS	76.1	5 - 145		21-Mar-22 22:58	1
13C-PCB-32	IS	106	5 - 145		21-Mar-22 22:58	1
13C-PCB-47	IS	92.4	5 - 145		21-Mar-22 22:58	1
13C-PCB-52	IS	92.8	5 - 145		21-Mar-22 22:58	1
13C-PCB-70	IS	87.7	5 - 145		21-Mar-22 22:58	1
13C-PCB-77	IS	84.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-81	IS	92.5	10 - 145		21-Mar-22 22:58	1
13C-PCB-101	IS	92.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-105	IS	82.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-114	IS	83.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-118	IS	93.6	10 - 145		21-Mar-22 22:58	1
13C-PCB-123	IS	95.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-126	IS	71.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-138	IS	96.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-153	IS	98.4	10 - 145		21-Mar-22 22:58	1
13C-PCB-156	IS	83.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-157	IS	88.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-159	IS	91.8	10 - 145		21-Mar-22 22:58	1
13C-PCB-167	IS	92.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-169	IS	64.5	10 - 145		21-Mar-22 22:58	1

Sample ID: 1221-831_13049_002	**EPA Method 1668C**

Client Data

Name:	Enthalpy Analytical, LLC
Project:	Ecolube / RTO #1 Outlet / 006AS-011833
Matrix:	Air
Date Collected:	27-Jan-22 13:45

Laboratory Data

Lab Sample:	2203071-02	Date Received:	07-Mar-22 09:45
QC Batch:	B22C199	Date Extracted:	21-Mar-22
		Column:	ZB-1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-170	IS	79.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-180	IS	81.1	10 - 145		21-Mar-22 22:58	1
13C-PCB-188	IS	97.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-189	IS	47.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-194	IS	105	10 - 145		21-Mar-22 22:58	1
13C-PCB-206	IS	83.6	10 - 145		21-Mar-22 22:58	1
13C-PCB-209	IS	81.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-79	PS	80.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-178	PS	94.2	10 - 145		21-Mar-22 22:58	1

EDL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_003	EPA Method 1668C

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-03	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:10				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	913				21-Mar-22 23:58	1
PCB-18	550				21-Mar-22 23:58	1
PCB-28	439				21-Mar-22 23:58	1
PCB-44	206				21-Mar-22 23:58	1
PCB-52/69	228				21-Mar-22 23:58	1
PCB-66/76	115				21-Mar-22 23:58	1
PCB-77	ND		19.2		21-Mar-22 23:58	1
PCB-81	ND	6.23			21-Mar-22 23:58	1
PCB-90/101	183				21-Mar-22 23:58	1
PCB-105	50.0				21-Mar-22 23:58	1
PCB-106/118	109				21-Mar-22 23:58	1
PCB-114	ND	8.30			21-Mar-22 23:58	1
PCB-123	ND	5.81			21-Mar-22 23:58	1
PCB-126	ND	9.09			21-Mar-22 23:58	1
PCB-128/162	ND	13.2			21-Mar-22 23:58	1
PCB-138/163/164	102			J	21-Mar-22 23:58	1
PCB-153	ND		76.0		21-Mar-22 23:58	1
PCB-156	ND	13.4			21-Mar-22 23:58	1
PCB-157	ND	13.0			21-Mar-22 23:58	1
PCB-167	ND	11.2			21-Mar-22 23:58	1
PCB-169	ND	17.0			21-Mar-22 23:58	1
PCB-170	ND	19.1			21-Mar-22 23:58	1
PCB-180	ND		71.1		21-Mar-22 23:58	1
PCB-182/187	ND	9.29			21-Mar-22 23:58	1
PCB-189	ND	18.4			21-Mar-22 23:58	1
PCB-195	ND	29.4			21-Mar-22 23:58	1
PCB-206	ND	47.8			21-Mar-22 23:58	1
PCB-209	ND	30.1			21-Mar-22 23:58	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	76.0	5 - 145		21-Mar-22 23:58	1
13C-PCB-28	IS	86.9	5 - 145		21-Mar-22 23:58	1
13C-PCB-32	IS	93.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-47	IS	79.5	5 - 145		21-Mar-22 23:58	1
13C-PCB-52	IS	68.6	5 - 145		21-Mar-22 23:58	1
13C-PCB-70	IS	77.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-77	IS	75.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-81	IS	76.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-101	IS	74.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-105	IS	79.7	10 - 145		21-Mar-22 23:58	1
13C-PCB-114	IS	82.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-118	IS	81.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-123	IS	82.5	10 - 145		21-Mar-22 23:58	1
13C-PCB-126	IS	67.8	10 - 145		21-Mar-22 23:58	1
13C-PCB-138	IS	100	10 - 145		21-Mar-22 23:58	1
13C-PCB-153	IS	99.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-156	IS	80.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-157	IS	88.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-159	IS	99.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-167	IS	93.8	10 - 145		21-Mar-22 23:58	1
13C-PCB-169	IS	65.2	10 - 145		21-Mar-22 23:58	1

Sample ID: 1221-831_13049_003 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-03	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:10				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-170	IS	54.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-180	IS	70.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-188	IS	83.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-189	IS	37.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-194	IS	90.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-206	IS	77.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-209	IS	66.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-79	PS	89.7	10 - 145		21-Mar-22 23:58	1
13C-PCB-178	PS	123	10 - 145		21-Mar-22 23:58	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_004 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-04	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:20				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	208				22-Mar-22 00:59	1
PCB-18	175				22-Mar-22 00:59	1
PCB-28	118				22-Mar-22 00:59	1
PCB-44	79.2				22-Mar-22 00:59	1
PCB-52/69	ND		71.0		22-Mar-22 00:59	1
PCB-66/76	23.1			J	22-Mar-22 00:59	1
PCB-77	ND	3.48			22-Mar-22 00:59	1
PCB-81	ND	3.64			22-Mar-22 00:59	1
PCB-90/101	ND		43.1		22-Mar-22 00:59	1
PCB-105	ND	4.09			22-Mar-22 00:59	1
PCB-106/118	ND		34.6		22-Mar-22 00:59	1
PCB-114	ND	4.25			22-Mar-22 00:59	1
PCB-123	ND	3.30			22-Mar-22 00:59	1
PCB-126	ND	4.44			22-Mar-22 00:59	1
PCB-128/162	ND	5.61			22-Mar-22 00:59	1
PCB-138/163/164	ND		26.8		22-Mar-22 00:59	1
PCB-153	23.2			J	22-Mar-22 00:59	1
PCB-156	ND	4.60			22-Mar-22 00:59	1
PCB-157	ND	5.05			22-Mar-22 00:59	1
PCB-167	ND	4.53			22-Mar-22 00:59	1
PCB-169	ND	5.78			22-Mar-22 00:59	1
PCB-170	ND	7.61			22-Mar-22 00:59	1
PCB-180	ND	7.37			22-Mar-22 00:59	1
PCB-182/187	ND	5.86			22-Mar-22 00:59	1
PCB-189	ND	5.23			22-Mar-22 00:59	1
PCB-195	ND	9.54			22-Mar-22 00:59	1
PCB-206	ND	12.1			22-Mar-22 00:59	1
PCB-209	ND	8.29			22-Mar-22 00:59	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	68.1	5 - 145		22-Mar-22 00:59	1
13C-PCB-28	IS	68.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-32	IS	70.2	5 - 145		22-Mar-22 00:59	1
13C-PCB-47	IS	79.8	5 - 145		22-Mar-22 00:59	1
13C-PCB-52	IS	79.9	5 - 145		22-Mar-22 00:59	1
13C-PCB-70	IS	87.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-77	IS	87.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-81	IS	90.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-101	IS	90.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-105	IS	78.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-114	IS	74.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-118	IS	98.0	10 - 145		22-Mar-22 00:59	1
13C-PCB-123	IS	98.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-126	IS	66.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-138	IS	88.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-153	IS	86.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-156	IS	87.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-157	IS	91.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-159	IS	92.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-167	IS	91.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-169	IS	71.8	10 - 145		22-Mar-22 00:59	1

Sample ID: 1221-831_13049_004 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-04	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:20				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-170	IS	93.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-180	IS	82.9	10 - 145		22-Mar-22 00:59	1
13C-PCB-188	IS	91.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-189	IS	89.0	10 - 145		22-Mar-22 00:59	1
13C-PCB-194	IS	102	10 - 145		22-Mar-22 00:59	1
13C-PCB-206	IS	101	10 - 145		22-Mar-22 00:59	1
13C-PCB-209	IS	106	10 - 145		22-Mar-22 00:59	1
13C-PCB-79	PS	79.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-178	PS	87.1	10 - 145		22-Mar-22 00:59	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: MB_13049_DF/PCB/PAH **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-05	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	22-Feb-22 01:40				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	ND	14.0			21-Mar-22 17:56	1
PCB-18	ND	6.14			21-Mar-22 17:56	1
PCB-28	ND	4.01			21-Mar-22 17:56	1
PCB-44	ND	5.16			21-Mar-22 17:56	1
PCB-52/69	ND	3.66			21-Mar-22 17:56	1
PCB-66/76	ND	2.95			21-Mar-22 17:56	1
PCB-77	ND	3.23			21-Mar-22 17:56	1
PCB-81	ND	3.46			21-Mar-22 17:56	1
PCB-90/101	ND	5.04			21-Mar-22 17:56	1
PCB-105	ND	3.66			21-Mar-22 17:56	1
PCB-106/118	ND	3.25			21-Mar-22 17:56	1
PCB-114	ND	3.30			21-Mar-22 17:56	1
PCB-123	ND	3.83			21-Mar-22 17:56	1
PCB-126	ND	3.35			21-Mar-22 17:56	1
PCB-128/162	ND	2.41			21-Mar-22 17:56	1
PCB-138/163/164	ND	2.05			21-Mar-22 17:56	1
PCB-153	ND	2.64			21-Mar-22 17:56	1
PCB-156	ND	2.01			21-Mar-22 17:56	1
PCB-157	ND	2.17			21-Mar-22 17:56	1
PCB-167	ND	1.97			21-Mar-22 17:56	1
PCB-169	ND	2.45			21-Mar-22 17:56	1
PCB-170	ND	2.71			21-Mar-22 17:56	1
PCB-180	ND	2.92			21-Mar-22 17:56	1
PCB-182/187	ND	2.12			21-Mar-22 17:56	1
PCB-189	ND	2.08			21-Mar-22 17:56	1
PCB-195	ND	2.55			21-Mar-22 17:56	1
PCB-206	ND	2.40			21-Mar-22 17:56	1
PCB-209	ND	1.82			21-Mar-22 17:56	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	81.2	5 - 145		21-Mar-22 17:56	1
13C-PCB-28	IS	78.8	5 - 145		21-Mar-22 17:56	1
13C-PCB-32	IS	90.4	5 - 145		21-Mar-22 17:56	1
13C-PCB-47	IS	80.2	5 - 145		21-Mar-22 17:56	1
13C-PCB-52	IS	80.3	5 - 145		21-Mar-22 17:56	1
13C-PCB-70	IS	83.5	5 - 145		21-Mar-22 17:56	1
13C-PCB-77	IS	81.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-81	IS	80.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-101	IS	80.8	10 - 145		21-Mar-22 17:56	1
13C-PCB-105	IS	79.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-114	IS	86.2	10 - 145		21-Mar-22 17:56	1
13C-PCB-118	IS	94.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-123	IS	85.2	10 - 145		21-Mar-22 17:56	1
13C-PCB-126	IS	75.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-138	IS	89.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-153	IS	75.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-156	IS	91.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-157	IS	90.7	10 - 145		21-Mar-22 17:56	1
13C-PCB-159	IS	91.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-167	IS	94.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-169	IS	81.5	10 - 145		21-Mar-22 17:56	1

Sample ID: MB_13049_DF/PCB/PAH | **EPA Method 1668C**

Client Data

Name: Enthalpy Analytical, LLC
Project: Ecolube / RTO #1 Outlet / 006AS-011833
Matrix: Air
Date Collected: 22-Feb-22 01:40

Laboratory Data

Lab Sample: 2203071-05
QC Batch: B22C199
Date Received: 07-Mar-22 09:45
Date Extracted: 21-Mar-22
Column: ZB-1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-170	IS	92.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-180	IS	76.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-188	IS	92.4	10 - 145		21-Mar-22 17:56	1
13C-PCB-189	IS	83.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-194	IS	88.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-206	IS	75.7	10 - 145		21-Mar-22 17:56	1
13C-PCB-209	IS	79.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-79	PS	80.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-178	PS	88.4	10 - 145		21-Mar-22 17:56	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: BCS_13049_PCB | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-07	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	22-Feb-22 01:40				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	11300				21-Mar-22 15:55	1
PCB-18	5230				21-Mar-22 15:55	1
PCB-28	4790				21-Mar-22 15:55	1
PCB-44	5020				21-Mar-22 15:55	1
PCB-52/69	10500				21-Mar-22 15:55	1
PCB-66/76	10400				21-Mar-22 15:55	1
PCB-77	5370				21-Mar-22 15:55	1
PCB-81	5200				21-Mar-22 15:55	1
PCB-90/101	10000				21-Mar-22 15:55	1
PCB-105	5270				21-Mar-22 15:55	1
PCB-106/118	10900				21-Mar-22 15:55	1
PCB-114	5340				21-Mar-22 15:55	1
PCB-123	5180				21-Mar-22 15:55	1
PCB-126	5290				21-Mar-22 15:55	1
PCB-128/162	10900				21-Mar-22 15:55	1
PCB-138/163/164	16100				21-Mar-22 15:55	1
PCB-153	5380				21-Mar-22 15:55	1
PCB-156	5180				21-Mar-22 15:55	1
PCB-157	5110				21-Mar-22 15:55	1
PCB-167	5150				21-Mar-22 15:55	1
PCB-169	5120				21-Mar-22 15:55	1
PCB-170	5050				21-Mar-22 15:55	1
PCB-180	5160				21-Mar-22 15:55	1
PCB-182/187	9960				21-Mar-22 15:55	1
PCB-189	5150				21-Mar-22 15:55	1
PCB-195	4910				21-Mar-22 15:55	1
PCB-206	5110				21-Mar-22 15:55	1
PCB-209	5150				21-Mar-22 15:55	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	97.2	5 - 145		21-Mar-22 15:55	1
13C-PCB-28	IS	98.2	5 - 145		21-Mar-22 15:55	1
13C-PCB-32	IS	105	5 - 145		21-Mar-22 15:55	1
13C-PCB-47	IS	108	5 - 145		21-Mar-22 15:55	1
13C-PCB-52	IS	107	5 - 145		21-Mar-22 15:55	1
13C-PCB-70	IS	111	5 - 145		21-Mar-22 15:55	1
13C-PCB-77	IS	97.0	10 - 145		21-Mar-22 15:55	1
13C-PCB-81	IS	113	10 - 145		21-Mar-22 15:55	1
13C-PCB-101	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-105	IS	98.4	10 - 145		21-Mar-22 15:55	1
13C-PCB-114	IS	103	10 - 145		21-Mar-22 15:55	1
13C-PCB-118	IS	97.9	10 - 145		21-Mar-22 15:55	1
13C-PCB-123	IS	92.4	10 - 145		21-Mar-22 15:55	1
13C-PCB-126	IS	89.6	10 - 145		21-Mar-22 15:55	1
13C-PCB-138	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-153	IS	103	10 - 145		21-Mar-22 15:55	1
13C-PCB-156	IS	104	10 - 145		21-Mar-22 15:55	1
13C-PCB-157	IS	86.8	10 - 145		21-Mar-22 15:55	1
13C-PCB-159	IS	101	10 - 145		21-Mar-22 15:55	1
13C-PCB-167	IS	100	10 - 145		21-Mar-22 15:55	1
13C-PCB-169	IS	104	10 - 145		21-Mar-22 15:55	1

Sample ID: BCS_13049_PCB **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-07	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	22-Feb-22 01:40				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-170	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-180	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-188	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-189	IS	115	10 - 145		21-Mar-22 15:55	1
13C-PCB-194	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-206	IS	108	10 - 145		21-Mar-22 15:55	1
13C-PCB-209	IS	108	10 - 145		21-Mar-22 15:55	1
13C-PCB-79	PS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-178	PS	106	10 - 145		21-Mar-22 15:55	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
RL	For 537.1, the reported RLs are the MRLs.
TEQ	Toxic Equivalency, sum of the toxic equivalency factors (TEF) multiplied by the sample concentrations.
TEQMax	TEQ calculation that uses the detection limit as the concentration for non-detects
TEQMin	TEQ calculation that uses zero as the concentration for non-detects
TEQRisk	TEQ calculation that uses ½ the detection limit as the concentration for non-detects
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	21-023-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-26
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2020018
Massachusetts Department of Environmental Protection	M-CA413
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1980678
New Hampshire Environmental Accreditation Program	207720
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Ohio Environmental Protection Agency	87778
Oregon Laboratory Accreditation Program	4042-016
Pennsylvania Department of Environmental Protection	017
Texas Commission on Environmental Quality	T104704189-21-12
Vermont Department of Health	VT-4042
Virginia Department of General Services	10769
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p- Dioxins & Polychlorinated Dibenzofurans	EPA 23
Polychlorinated Dibenzodioxins in Ambient Air by GC/HRMS	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613/1613B
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537.1
Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry	EPA 533
Perfluorooctanesulonate (PFOS) and Perfluorooctanoate (PFOA) - Method for Unfiltered Samples Using Solid Phase Extraction and Liquid Chromatography/Mass Spectrometry	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MONTROSE AIR QUALITY SERVICES
Portland Location
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050 | Fax (503) 255-0505

COPY

CHAIN OF CUSTODY

1221-831

(Impinger Rinses) Fedex, 7759 2881 9840, Cooler, on ice, no seals, good condition DK 2/2/22 11:15 3.7°T9

(Traps / Filters) Fedex, 7759 1713 7497, cooler, blue ice, no seals, good condition

(Acetone/Toluene Rinses) Fedex, 7759 2882 0134, cooler, on ice, no seals, good condition DK 2/2/22 11:15 4.2°T9

DK 2/1/22

Lab info: 2203071 10.7°C Enthalpy

Client / Project:	Project / Sample Location:	Test / Analytical Method:
Ecolube	RTO #1 Outlet	Revised Method 23 per Enthalpy SOPs
Project No.: 006AS-011833	**Purchase Order No:**	**Special Analysis / Detection Limit / Reporting Instructions:** Each dioxin&furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners, plus each PCB congener and PAH and PAN-derivative listed. Chlorobenzene and chlorophenol. List is attached to this COC.
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com jheffernan@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
R1 Filter	1/26/22	1845	1			Cooler
R1 Ace & Tolu	1/26/22	1845	1		Acetone and Toluene	
R1 XAD Trap	1/26/22	1845	1			Cooler
R1 Imp Cont & Rinse	1/26/22	1845	1		H2O, Acetone and Toluene	
R2 Filter	1/27/22	1345	1			Cooler
R2 Ace & Tolu	1/27/22	1345	1		Acetone and Toluene	
R2 XAD Trap	1/27/22	1345	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
R3 Filter	1/27/22	1910	2			Cooler
R3 Ace & Tolu	1/27/22	1910	1		Acetone and Toluene	
R3 XAD Trap	1/27/22	1910	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
FPB Filter	1/27/22	1920	1			Cooler
FPB Ace & Tolu	1/27/22	1920	1		Acetone and Toluene	
FPB XAD Trap	1/27/22	1920	1			Cooler
FPB Imp Cont & Rinse	1/27/22	1920	1		H2O, Acetone and Toluene	
Total Containers			17			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
[signature]	1/31/22	1111	Dallas King	2/1/22	11:30	10.6° T9
Alan Kuyn	2/25/22	1130	[signature]	03/07/22	0945	10.7°C

Key: PCDD = Polychlorinated Dibenzo-p-Dioxin, PCDF = Polychlorinated Dibenzofuran, FB = Field Blank, RB = Reagent Blank

2203071 10.7°C

Matrix: air	Batch #: 13049			Extraction Cycle Times
Extraction Type:		Init.	Date	Start: 1:40 Stop: 9:00 Start Date: 2/22/22 HEX
☐SDS ☐SPE ☐Liq-Liq ☐SEP	Extraction	OK/Bu	2/22/22	Start: 2:30 Stop: 9:00 Start Date: 2/23/22 TOL
☑PCDD/F ☑PCB ☑PAH	Clean Up	OK/Bu	2/24/22	Start: — Stop: — Start Date: —
☐Other:	Transfer	OK/Bu	2/24/22	Split: (1/2) (1/4) (*) Final Volume: 20 µL — DF
				PCB/PAH – 100 µL

Lab Sample ID	QC Type	Wt. (g)/(Vol. (mL))	Extr. Pos.#	Observations	pH
1221-831_13049_001	--------	443.9 —	3	—	1
1221-831_13049_002	--------	412.5 —	4	—	1
1221-831_13049_003	--------	420.7 —	5	—	1
1221-831_13049_004	--------	258.4 —	6	—	5
MB_13049_DF/PCB/PAH	--------	—	1	—	n/a
LCS_13049_DF/PCB/PAH	--------	—	2	—	n/a
BCS_13049_DF	--------	—	—	—	n/a
BCS_13049_PCB	--------	—	—	—	n/a
BCS_13049_PAH	--------	—	—	—	n/a

OK 2/24/22

MS Parent Sample (if used)
—

Supply IDs			Supply IDs (Continued)			Equipment IDs	
Item	Supplier	Lot/Prep ID	Item	Supplier	Lot/ Prep ID	Balance	1
Toluene	Fisher	216931	Cl Strips	—	—	Pipettes	P25, P18, P16
Acid Silica	—	EUPrep 2-22-1	pH Strips	Merck	HC157843		
Base Silica	—	EUPrep 2-21-8	Sox filter	Millipore	R1EB97823		
Silica	Acros	A0391958	Glass wool	—	14721999		
Florisil	Sigma	57209	—	—	—		
Hexane	Fisher	213778	Comments:				
CH_2Cl_2	Fisher	214276	(*) Note: M0010 FV=1000µL				
Tetradecane	—	STBK2282	Bu 2/24/22				
Na_2SO_4	Merck	17B155209					
$AgNO_3$	—	EUPrep 2-22-7					
Hydromatrix	—	—					
H2SO4	—	—					

OK 2/26/22

Reviewer Initials / Date: ____________________ EU083_v1 (Air Sample Observations)

2203071

Air Sample Fraction Observations					
		Init.	Date	ENTHALPY ANALYTICAL	
Extraction Prep:	13049	OK	2/22/22		

Lab Sample ID	XAD	Filter(s)	Rinses	Glasswool	Other
1221-831-001	YW on top, S	BK, B	BK PM	WH, W	—
1221-831-002	YW on top, S	BK	BK PM	WH, W	—
1221-831-003	WH, S	BK, B	BK PM	WH, W	—
1221-831-004	WH, F	WH, C	BK PM	WH, D	—

OK 2/22/22

COMMON OBSERVATION ABBREVIATIONS

- B = BULLSEYE
- BE = BEIGE
- BK = BLACK
- C = CLEAN
- D = DRY
- F = FREE FLOWING
- GY = GREY
- M = MOIST
- PM = PARTICULATES
- S = STICKY
- W = WET
- WH = WHITE
- YW = YELLOW

Comments:
Note: All samples have a fuel smell. B 2/22/22

1221-831_**MB**
MAQS-Portland, OR
Prep Date: 01/05/2022
DF/PAH/PCB

Alicia Kyger 2/22/22

Reviewer Initials / Date: ____________

EU083_v1 (Air Sample Observations)

2203071

Spike Profile Sheet

Batch#: 13049

ENTHALPY ANALYTICAL

Comments: Bn 2/25/22

NOTE: ALL Ax STANDARDS SOLUTIONS ARE ONLY SPIKED INTO BCS, LCS, OPR AND/OR MS/MSD

PCDD/F

ES: 40 µL @ 100pg/uL	Ax-A: 40 µL @ 10pg/uL	Ax-B: 40 µL @ 10pg/uL	AS: 40 µL @ 100pg/uL
ID: SID0443	ID: SIDAJ57	ID: SIDAK50	ID: SIDAN71
Exp.: AUG 2028	Exp.: APR 2026	Exp.: OCT 2025	Exp.: AUG 2023
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/24/22
Witness: Date:	Witness: Date:	Witness: Date:	Witness: Date:
CS: µL @	JS: 20 µL @ 100pg/uL	µL @	µL @
ID: Bn	ID: SIDAJ60	ID:	ID: Bn
Exp.: 2/22/22	Exp.: APR 2026	Exp.:	Exp.: 2/24/22
Spiker:	Spiker: Bn 2/24/22	Spiker:	Spiker:
Witness: Date:	Witness: Date:	Witness: Date:	Witness: Date:

PCB

EE Bn 2/22/22
NS: EE Bn 2/22/22

ES: 10 µL @ 0.5-2.0ng/uL	~~Ax1668/209~~: IS: 10 µL @ 1ug/mL		CS: µL @
ID: SID0596	ID: SID0595		ID: Bn
Exp.: 6/21/22	Exp.: 5/14/22		Exp.: 2/22/22
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22		Spiker:
Witness: Date:	Witness: Date:		Witness: Date:
JS: µL @	FS: µL @	: µL @	
ID:	ID: Bn	ID:	
Exp.:	Exp.: 2/24/22	Exp.:	
Spiker:	Spiker:	Spiker:	
Witness: Date:	Witness: Date:	Witness: Date:	

PAH

ES: 80 µL @ 500pg/uL	Ax: 80 µL @ 500pg/uL	AS: 80 µL @ 500pg/uL	CS: µL @
ID: SIDAD51	ID: SIDAK59	ID: SIDAN47	ID: Bn
Exp.: NOV 2022	Exp.: MAY 2022	Exp.: JUL 2022	Exp.: 2/22/22
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/24/22	Spiker:
Witness: Date:	Witness: Date:	Witness: Date:	Witness: Date:
JS: 80 µL @ 125pg/uL	µL @	8270 MegaMix: $\boxed{250\,mL}$ at 1000ug/mL	8270 Acid surr.: $\boxed{25\,mL}$ at 10,000ug/mL
ID: SIDAN48	ID: Bn	ID: SID0639	ID: SID0628
Exp.: JUL 2022	Exp.: 2/24/22	Exp: 3/2023	Exp: 10/2026
Spiker: Bn 2/24/22	Spiker:	spiker: Bn 2/22/22	spiker: Bn 2/22/22
Witness: Date:	Witness: Date:		

Reviewer Initials / Date: ______________ EU083_v1 (Air Sample Observations)

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2203071 TAT std

Samples Arrival:	**Date/Time** 03/07/22 0945	**Initials:** MWS	**Location:** WR-2 **Shelf/Rack:** N/A

Delivered By:	FedEx	UPS	On Trac	GLS	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Techni Ice	Dry Ice	None

Temp °C: 10.7 **(uncorrected)**	**Probe used:** Y / N	**Thermometer ID:** DT-3
Temp °C: 10.7 **(corrected)**		

	YES	NO	NA
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Airbill — Trk # 7761 9894 6528	✓		
Shipping Documentation Present?	✓		
Shipping Container: Vista / Client / Retain / Return / Dispose			
Chain of Custody / Sample Documentation Present?	✓		
Chain of Custody / Sample Documentation Complete?	✓		
Holding Time Acceptable?	✓		

Logged In:	**Date/Time** 03/09/22 0815	**Initials:** MWS	**Location:** R-9 **Shelf/Rack:** N/A

	YES	NO	NA
COC Anomaly/Sample Acceptance Form completed?		✓	✓

Comments:

ID.: LR – SLC *Rev No.:* 6 *Rev Date:* 07/16/2020 *Page:* 1 of 1

CoC/Label Reconciliation Report WO# 2203071

LabNumber	CoC Sample ID	sample label	SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2203071-01	A 1221-831_13049_001	☑ 1221-831_001 Batch 13049 PCB	R1	26-Jan-22 18:45	☐ (a) (c)	~~HDPE 15mL Tube~~ (D)	Air	
2203071-02	A 1221-831_13049_002	☑ _002	R2	27-Jan-22 13:45	☐	HDPE 15mL Tube	Air	
2203071-03	A 1221-831_13049_003	☑ _003	R3	27-Jan-22 19:10	☐	HDPE 15mL Tube	Air	
2203071-04	A 1221-831_13049_004	☑ _004	FPB	27-Jan-22 19:20	☐	HDPE 15mL Tube	Air	
2203071-05	A MB_13049_DF/PCB/PAH	☑ MB Batch 13049 PCB		22-Feb-22 01:40	☐ (B)	HDPE 15mL Tube	Air	
2203071-06	A LCS_13049_DF/PCB/PAH	☑ LCS Batch 13049 PCB		22-Feb-22 01:40	☐	HDPE 15mL Tube	Air	
2203071-07	A BCS_13049_PCB	☑ 1221-831_BCS mass-Portland, OR Batch 13049 PCB		22-Feb-22 01:40	☐	~~HDPE 15mL Tube~~	Air	

wws 03/10/22

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Adequate Sample Volume?	✓		
Container Type Appropriate for Analysis(es)	✓		

Comments:
(a) used sample collection date/time
(B) used extraction start date/time
(c) no collection/extraction date/time listed on sample
(D) received in clear glass ~~vial~~ ampule inside of HDPE 15mL tube wws 03/10/22

Preservation Documented: Na2S2O3 Trizma NH4CH3CO2 None Other

Verifed by/Date: wws 03/10/22

Appendix C.2
Additional PCB Analyses

May 26, 2022

Vista Work Order No. 2203071

Mr. Mark Hager
Enthalpy Analytical, LLC
2714 Exchange Dr.
Wilmington, NC 28405

Dear Mr. Hager,

Enclosed are the additional results for the sample set received at Vista Analytical Laboratory on March 07, 2022 under your Project Name 'Ecolube / RTO #1 Outlet / 006AS-011833'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at jfox@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Jamie Fox
Laboratory Director

Vista Work Order No. 2203071
Case Narrative

Sample Condition on Receipt:

Seven extracts were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. The extracts were received in good condition and within the method temperature requirements. As requested, the extract for LCS_13049_DF/PCB/PAH was not analyzed. The report was amended to include the results for PCB homologue totals. The reported results for the selected list of PCB congeners may be different from the previously reported results. This is due to the re-processing of the sample data to obtain the PCB homologue totals.

Analytical Notes:

EPA Method 1668C

These samples were extracted by Enthalpy Analytical - Wilmington Laboratory. The extracts were processed by Vista Analytical Laboratory and analyzed for a selected list of PCB congeners by EPA Method 1668C using a ZB-1 GC column.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and a Laboratory Control Sample (LCS) were prepared by Enthalpy Analytical - Wilmington Laboratory and analyzed by Vista Analytical Laboratory. No analytes were detected in the Method Blank.

Labeled standard recoveries for all QC and field samples were within method acceptance criteria.

The signal-to-noise response of the labeled standard 13C-PCB-1 did not meet the method specified criteria of greater than or equal to 10:1 for sample "1221-831_13049_001".

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2203071-01	1221-831_13049_001	26-Jan-22 18:45	07-Mar-22 09:45	Clear Ampule
2203071-02	1221-831_13049_002	27-Jan-22 13:45	07-Mar-22 09:45	Clear Ampule
2203071-03	1221-831_13049_003	27-Jan-22 19:10	07-Mar-22 09:45	Clear Ampule
2203071-04	1221-831_13049_004	27-Jan-22 19:20	07-Mar-22 09:45	Clear Ampule
2203071-05	MB_13049_DF/PCB/PAH	22-Feb-22 01:40	07-Mar-22 09:45	Clear Ampule
2203071-06	LCS_13049_DF/PCB/PAH	22-Feb-22 01:40	07-Mar-22 09:45	Clear Ampule
2203071-07	BCS_13049_PCB	22-Feb-22 01:40	07-Mar-22 09:45	Clear Ampule

ANALYTICAL RESULTS

Sample ID: 1221-831_13049_001 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-01	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	26-Jan-22 18:45				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	13800				21-Mar-22 21:57	1
PCB-18	9710				21-Mar-22 21:57	1
PCB-28	7820				21-Mar-22 21:57	1
PCB-44	3320				21-Mar-22 21:57	1
PCB-52/69	3410				21-Mar-22 21:57	1
PCB-66/76	1620				21-Mar-22 21:57	1
PCB-77	175				21-Mar-22 21:57	1
PCB-81	14.5			J	21-Mar-22 21:57	1
PCB-90/101	1580				21-Mar-22 21:57	1
PCB-105	356				21-Mar-22 21:57	1
PCB-106/118	947				21-Mar-22 21:57	1
PCB-114	ND	16.8			21-Mar-22 21:57	1
PCB-123	24.8			J	21-Mar-22 21:57	1
PCB-126	ND	18.4			21-Mar-22 21:57	1
PCB-128/162	83.7			J	21-Mar-22 21:57	1
PCB-138/163/164	582				21-Mar-22 21:57	1
PCB-153	553				21-Mar-22 21:57	1
PCB-156	50.1				21-Mar-22 21:57	1
PCB-157	ND	12.3			21-Mar-22 21:57	1
PCB-167	ND	10.8			21-Mar-22 21:57	1
PCB-169	ND	18.6			21-Mar-22 21:57	1
PCB-170	61.1				21-Mar-22 21:57	1
PCB-180	170				21-Mar-22 21:57	1
PCB-182/187	ND		96.0		21-Mar-22 21:57	1
PCB-189	ND	8.52			21-Mar-22 21:57	1
PCB-195	ND	16.5			21-Mar-22 21:57	1
PCB-206	ND	14.6			21-Mar-22 21:57	1
PCB-209	ND	10.2			21-Mar-22 21:57	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	89.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-28	IS	77.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-32	IS	112	5 - 145		21-Mar-22 21:57	1
13C-PCB-47	IS	86.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-52	IS	87.6	5 - 145		21-Mar-22 21:57	1
13C-PCB-70	IS	93.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-77	IS	88.9	10 - 145		21-Mar-22 21:57	1
13C-PCB-80	IS	93.7	10 - 145		21-Mar-22 21:57	1
13C-PCB-81	IS	91.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-101	IS	86.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-105	IS	86.7	10 - 145		21-Mar-22 21:57	1
13C-PCB-114	IS	85.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-118	IS	96.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-123	IS	101	10 - 145		21-Mar-22 21:57	1
13C-PCB-126	IS	66.4	10 - 145		21-Mar-22 21:57	1
13C-PCB-153	IS	102	10 - 145		21-Mar-22 21:57	1
13C-PCB-156	IS	88.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-157	IS	89.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-159	IS	99.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-167	IS	95.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-169	IS	60.9	10 - 145		21-Mar-22 21:57	1
13C-PCB-170	IS	75.2	10 - 145		21-Mar-22 21:57	1

Sample ID: 1221-831_13049_001 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-01	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	26-Jan-22 18:45				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-180	IS	85.5	10 - 145		21-Mar-22 21:57	1
13C-PCB-188	IS	99.5	10 - 145		21-Mar-22 21:57	1
13C-PCB-189	IS	47.4	10 - 145		21-Mar-22 21:57	1
13C-PCB-194	IS	127	10 - 145		21-Mar-22 21:57	1
13C-PCB-206	IS	109	10 - 145		21-Mar-22 21:57	1
13C-PCB-209	IS	91.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-79	PS	99.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-178	PS	120	10 - 145		21-Mar-22 21:57	1

EDL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_002 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-02	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 13:45				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	2220				21-Mar-22 22:58	1
PCB-18	965				21-Mar-22 22:58	1
PCB-28	1230				21-Mar-22 22:58	1
PCB-44	265				21-Mar-22 22:58	1
PCB-52/69	349				21-Mar-22 22:58	1
PCB-66/76	167				21-Mar-22 22:58	1
PCB-77	ND		41.1		21-Mar-22 22:58	1
PCB-81	ND	4.68			21-Mar-22 22:58	1
PCB-90/101	181				21-Mar-22 22:58	1
PCB-105	54.6				21-Mar-22 22:58	1
PCB-106/118	ND		115		21-Mar-22 22:58	1
PCB-114	ND	8.18			21-Mar-22 22:58	1
PCB-123	ND	5.89			21-Mar-22 22:58	1
PCB-126	ND	8.47			21-Mar-22 22:58	1
PCB-128/162	ND	12.3			21-Mar-22 22:58	1
PCB-138/163/164	97.1			J	21-Mar-22 22:58	1
PCB-153	76.9				21-Mar-22 22:58	1
PCB-156	ND	10.4			21-Mar-22 22:58	1
PCB-157	ND	11.3			21-Mar-22 22:58	1
PCB-167	ND	10.0			21-Mar-22 22:58	1
PCB-169	ND	14.8			21-Mar-22 22:58	1
PCB-170	ND	12.1			21-Mar-22 22:58	1
PCB-180	54.4				21-Mar-22 22:58	1
PCB-182/187	ND		23.7		21-Mar-22 22:58	1
PCB-189	ND	14.3			21-Mar-22 22:58	1
PCB-195	ND	24.0			21-Mar-22 22:58	1
PCB-206	ND	33.2			21-Mar-22 22:58	1
PCB-209	ND	17.7			21-Mar-22 22:58	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	83.0	5 - 145		21-Mar-22 22:58	1
13C-PCB-28	IS	76.1	5 - 145		21-Mar-22 22:58	1
13C-PCB-32	IS	106	5 - 145		21-Mar-22 22:58	1
13C-PCB-47	IS	92.4	5 - 145		21-Mar-22 22:58	1
13C-PCB-52	IS	92.8	5 - 145		21-Mar-22 22:58	1
13C-PCB-70	IS	87.7	5 - 145		21-Mar-22 22:58	1
13C-PCB-77	IS	84.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-80	IS	98.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-81	IS	92.5	10 - 145		21-Mar-22 22:58	1
13C-PCB-101	IS	92.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-105	IS	82.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-114	IS	83.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-118	IS	93.6	10 - 145		21-Mar-22 22:58	1
13C-PCB-123	IS	95.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-126	IS	71.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-153	IS	98.4	10 - 145		21-Mar-22 22:58	1
13C-PCB-156	IS	83.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-157	IS	88.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-159	IS	91.8	10 - 145		21-Mar-22 22:58	1
13C-PCB-167	IS	92.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-169	IS	64.5	10 - 145		21-Mar-22 22:58	1
13C-PCB-170	IS	79.7	10 - 145		21-Mar-22 22:58	1

Sample ID: 1221-831_13049_002 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-02	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 13:45				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-180	IS	81.1	10 - 145		21-Mar-22 22:58	1
13C-PCB-188	IS	97.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-189	IS	47.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-194	IS	105	10 - 145		21-Mar-22 22:58	1
13C-PCB-206	IS	83.6	10 - 145		21-Mar-22 22:58	1
13C-PCB-209	IS	81.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-79	PS	80.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-178	PS	94.2	10 - 145		21-Mar-22 22:58	1

EDL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_003	EPA Method 1668C

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-03	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:10				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	913				21-Mar-22 23:58	1
PCB-18	550				21-Mar-22 23:58	1
PCB-28	439				21-Mar-22 23:58	1
PCB-44	206				21-Mar-22 23:58	1
PCB-52/69	230				21-Mar-22 23:58	1
PCB-66/76	115				21-Mar-22 23:58	1
PCB-77	ND		19.2		21-Mar-22 23:58	1
PCB-81	ND	6.23			21-Mar-22 23:58	1
PCB-90/101	182				21-Mar-22 23:58	1
PCB-105	51.5				21-Mar-22 23:58	1
PCB-106/118	109				21-Mar-22 23:58	1
PCB-114	ND	8.30			21-Mar-22 23:58	1
PCB-123	ND	5.81			21-Mar-22 23:58	1
PCB-126	ND	9.09			21-Mar-22 23:58	1
PCB-128/162	ND	13.2			21-Mar-22 23:58	1
PCB-138/163/164	102			J	21-Mar-22 23:58	1
PCB-153	ND		76.0		21-Mar-22 23:58	1
PCB-156	ND	13.4			21-Mar-22 23:58	1
PCB-157	ND	13.0			21-Mar-22 23:58	1
PCB-167	ND	11.2			21-Mar-22 23:58	1
PCB-169	ND	17.0			21-Mar-22 23:58	1
PCB-170	ND	19.1			21-Mar-22 23:58	1
PCB-180	ND		71.1		21-Mar-22 23:58	1
PCB-182/187	ND	9.29			21-Mar-22 23:58	1
PCB-189	ND	18.4			21-Mar-22 23:58	1
PCB-195	ND	29.4			21-Mar-22 23:58	1
PCB-206	ND	47.8			21-Mar-22 23:58	1
PCB-209	ND	30.1			21-Mar-22 23:58	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	76.0	5 - 145		21-Mar-22 23:58	1
13C-PCB-28	IS	86.9	5 - 145		21-Mar-22 23:58	1
13C-PCB-32	IS	93.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-47	IS	79.5	5 - 145		21-Mar-22 23:58	1
13C-PCB-52	IS	68.6	5 - 145		21-Mar-22 23:58	1
13C-PCB-70	IS	77.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-77	IS	75.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-80	IS	80.5	10 - 145		21-Mar-22 23:58	1
13C-PCB-81	IS	76.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-101	IS	74.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-105	IS	79.7	10 - 145		21-Mar-22 23:58	1
13C-PCB-114	IS	82.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-118	IS	81.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-123	IS	82.5	10 - 145		21-Mar-22 23:58	1
13C-PCB-126	IS	67.8	10 - 145		21-Mar-22 23:58	1
13C-PCB-153	IS	99.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-156	IS	80.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-157	IS	88.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-159	IS	99.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-167	IS	93.8	10 - 145		21-Mar-22 23:58	1
13C-PCB-169	IS	65.2	10 - 145		21-Mar-22 23:58	1
13C-PCB-170	IS	54.0	10 - 145		21-Mar-22 23:58	1

Sample ID: 1221-831_13049_003	**EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-03	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:10				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-180	IS	70.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-188	IS	83.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-189	IS	37.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-194	IS	90.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-206	IS	77.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-209	IS	66.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-79	PS	89.7	10 - 145		21-Mar-22 23:58	1
13C-PCB-178	PS	123	10 - 145		21-Mar-22 23:58	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_004 **EPA Method 1668C**

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-04	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:20				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	215				22-Mar-22 00:59	1
PCB-18	176				22-Mar-22 00:59	1
PCB-28	117				22-Mar-22 00:59	1
PCB-44	79.3				22-Mar-22 00:59	1
PCB-52/69	ND		70.6		22-Mar-22 00:59	1
PCB-66/76	25.1			J	22-Mar-22 00:59	1
PCB-77	ND	3.48			22-Mar-22 00:59	1
PCB-81	ND	3.64			22-Mar-22 00:59	1
PCB-90/101	ND		46.7		22-Mar-22 00:59	1
PCB-105	ND		9.05		22-Mar-22 00:59	1
PCB-106/118	39.8			J	22-Mar-22 00:59	1
PCB-114	ND	4.25			22-Mar-22 00:59	1
PCB-123	ND	3.30			22-Mar-22 00:59	1
PCB-126	ND	4.44			22-Mar-22 00:59	1
PCB-128/162	ND	5.61			22-Mar-22 00:59	1
PCB-138/163/164	ND		27.6		22-Mar-22 00:59	1
PCB-153	24.3			J	22-Mar-22 00:59	1
PCB-156	ND	4.60			22-Mar-22 00:59	1
PCB-157	ND	5.05			22-Mar-22 00:59	1
PCB-167	ND	4.53			22-Mar-22 00:59	1
PCB-169	ND	5.78			22-Mar-22 00:59	1
PCB-170	ND	7.61			22-Mar-22 00:59	1
PCB-180	ND	7.37			22-Mar-22 00:59	1
PCB-182/187	ND	5.86			22-Mar-22 00:59	1
PCB-189	ND	5.23			22-Mar-22 00:59	1
PCB-195	ND	9.54			22-Mar-22 00:59	1
PCB-206	ND	12.1			22-Mar-22 00:59	1
PCB-209	ND	8.29			22-Mar-22 00:59	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	68.1	5 - 145		22-Mar-22 00:59	1
13C-PCB-28	IS	68.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-32	IS	70.2	5 - 145		22-Mar-22 00:59	1
13C-PCB-47	IS	79.8	5 - 145		22-Mar-22 00:59	1
13C-PCB-52	IS	79.9	5 - 145		22-Mar-22 00:59	1
13C-PCB-70	IS	87.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-77	IS	87.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-80	IS	91.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-81	IS	90.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-101	IS	90.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-105	IS	78.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-114	IS	74.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-118	IS	98.0	10 - 145		22-Mar-22 00:59	1
13C-PCB-123	IS	98.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-126	IS	66.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-153	IS	86.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-156	IS	87.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-157	IS	91.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-159	IS	92.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-167	IS	91.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-169	IS	71.8	10 - 145		22-Mar-22 00:59	1
13C-PCB-170	IS	93.5	10 - 145		22-Mar-22 00:59	1

Sample ID: 1221-831_13049_004 **EPA Method 1668C**

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-04	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	27-Jan-22 19:20				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-180	IS	82.9	10 - 145		22-Mar-22 00:59	1
13C-PCB-188	IS	91.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-189	IS	89.0	10 - 145		22-Mar-22 00:59	1
13C-PCB-194	IS	102	10 - 145		22-Mar-22 00:59	1
13C-PCB-206	IS	101	10 - 145		22-Mar-22 00:59	1
13C-PCB-209	IS	106	10 - 145		22-Mar-22 00:59	1
13C-PCB-79	PS	79.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-178	PS	87.1	10 - 145		22-Mar-22 00:59	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: MB_13049_DF/PCB/PAH	EPA Method 1668C

Client Data

Name:	Enthalpy Analytical, LLC
Project:	Ecolube / RTO #1 Outlet / 006AS-011833
Matrix:	Air
Date Collected:	22-Feb-22 01:40

Laboratory Data

Lab Sample:	2203071-05	Date Received:	07-Mar-22 09:45
QC Batch:	B22C199	Date Extracted:	21-Mar-22
		Column:	ZB-1

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	ND	14.0			21-Mar-22 17:56	1
PCB-18	ND	6.14			21-Mar-22 17:56	1
PCB-28	ND	4.01			21-Mar-22 17:56	1
PCB-44	ND	5.16			21-Mar-22 17:56	1
PCB-52/69	ND	3.66			21-Mar-22 17:56	1
PCB-66/76	ND	2.95			21-Mar-22 17:56	1
PCB-77	ND	3.23			21-Mar-22 17:56	1
PCB-81	ND	3.46			21-Mar-22 17:56	1
PCB-90/101	ND	5.04			21-Mar-22 17:56	1
PCB-105	ND	3.66			21-Mar-22 17:56	1
PCB-106/118	ND	3.25			21-Mar-22 17:56	1
PCB-114	ND	3.30			21-Mar-22 17:56	1
PCB-123	ND	3.83			21-Mar-22 17:56	1
PCB-126	ND	3.35			21-Mar-22 17:56	1
PCB-128/162	ND	2.41			21-Mar-22 17:56	1
PCB-138/163/164	ND	2.05			21-Mar-22 17:56	1
PCB-153	ND	2.64			21-Mar-22 17:56	1
PCB-156	ND	2.01			21-Mar-22 17:56	1
PCB-157	ND	2.17			21-Mar-22 17:56	1
PCB-167	ND	1.97			21-Mar-22 17:56	1
PCB-169	ND	2.45			21-Mar-22 17:56	1
PCB-170	ND	2.71			21-Mar-22 17:56	1
PCB-180	ND	2.92			21-Mar-22 17:56	1
PCB-182/187	ND	2.12			21-Mar-22 17:56	1
PCB-189	ND	2.08			21-Mar-22 17:56	1
PCB-195	ND	2.55			21-Mar-22 17:56	1
PCB-206	ND	2.40			21-Mar-22 17:56	1
PCB-209	ND	1.82			21-Mar-22 17:56	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	81.2	5 - 145		21-Mar-22 17:56	1
13C-PCB-28	IS	78.8	5 - 145		21-Mar-22 17:56	1
13C-PCB-32	IS	90.4	5 - 145		21-Mar-22 17:56	1
13C-PCB-47	IS	80.2	5 - 145		21-Mar-22 17:56	1
13C-PCB-52	IS	80.3	5 - 145		21-Mar-22 17:56	1
13C-PCB-70	IS	83.5	5 - 145		21-Mar-22 17:56	1
13C-PCB-77	IS	81.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-80	IS	84.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-81	IS	80.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-101	IS	80.8	10 - 145		21-Mar-22 17:56	1
13C-PCB-105	IS	79.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-114	IS	86.2	10 - 145		21-Mar-22 17:56	1
13C-PCB-118	IS	94.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-123	IS	85.2	10 - 145		21-Mar-22 17:56	1
13C-PCB-126	IS	75.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-153	IS	75.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-156	IS	91.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-157	IS	90.7	10 - 145		21-Mar-22 17:56	1
13C-PCB-159	IS	91.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-167	IS	94.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-169	IS	81.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-170	IS	92.9	10 - 145		21-Mar-22 17:56	1

Sample ID: MB_13049_DF/PCB/PAH **EPA Method 1668C**

Client Data

Name:	Enthalpy Analytical, LLC	**Laboratory Data**			
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	Lab Sample:	2203071-05	Date Received:	07-Mar-22 09:45
Matrix:	Air	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Date Collected:	22-Feb-22 01:40			Column:	ZB-1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-180	IS	76.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-188	IS	92.4	10 - 145		21-Mar-22 17:56	1
13C-PCB-189	IS	83.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-194	IS	88.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-206	IS	75.7	10 - 145		21-Mar-22 17:56	1
13C-PCB-209	IS	79.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-79	PS	80.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-178	PS	88.4	10 - 145		21-Mar-22 17:56	1

EDL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

Sample ID: BCS_13049_PCB | **EPA Method 1668C**

Client Data
Name: Enthalpy Analytical, LLC
Project: Ecolube / RTO #1 Outlet / 006AS-011833
Matrix: Air
Date Collected: 22-Feb-22 01:40

Laboratory Data
Lab Sample: 2203071-07
QC Batch: B22C199
Date Received: 07-Mar-22 09:45
Date Extracted: 21-Mar-22
Column: ZB-1

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
PCB-5/8	11300				21-Mar-22 15:55	1
PCB-18	5230				21-Mar-22 15:55	1
PCB-28	4790				21-Mar-22 15:55	1
PCB-44	5020				21-Mar-22 15:55	1
PCB-52/69	10500				21-Mar-22 15:55	1
PCB-66/76	10100				21-Mar-22 15:55	1
PCB-77	5340				21-Mar-22 15:55	1
PCB-81	5200				21-Mar-22 15:55	1
PCB-90/101	10000				21-Mar-22 15:55	1
PCB-105	5270				21-Mar-22 15:55	1
PCB-106/118	10900				21-Mar-22 15:55	1
PCB-114	5340				21-Mar-22 15:55	1
PCB-123	5180				21-Mar-22 15:55	1
PCB-126	5290				21-Mar-22 15:55	1
PCB-128/162	10900				21-Mar-22 15:55	1
PCB-138/163/164	16100				21-Mar-22 15:55	1
PCB-153	5380				21-Mar-22 15:55	1
PCB-156	5180				21-Mar-22 15:55	1
PCB-157	5110				21-Mar-22 15:55	1
PCB-167	5150				21-Mar-22 15:55	1
PCB-169	5120				21-Mar-22 15:55	1
PCB-170	5050				21-Mar-22 15:55	1
PCB-180	5160				21-Mar-22 15:55	1
PCB-182/187	9960				21-Mar-22 15:55	1
PCB-189	5150				21-Mar-22 15:55	1
PCB-195	4910				21-Mar-22 15:55	1
PCB-206	5110				21-Mar-22 15:55	1
PCB-209	5150				21-Mar-22 15:55	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-9	IS	97.2	5 - 145		21-Mar-22 15:55	1
13C-PCB-28	IS	98.2	5 - 145		21-Mar-22 15:55	1
13C-PCB-32	IS	105	5 - 145		21-Mar-22 15:55	1
13C-PCB-47	IS	108	5 - 145		21-Mar-22 15:55	1
13C-PCB-52	IS	107	5 - 145		21-Mar-22 15:55	1
13C-PCB-70	IS	111	5 - 145		21-Mar-22 15:55	1
13C-PCB-77	IS	97.0	10 - 145		21-Mar-22 15:55	1
13C-PCB-80	IS	113	10 - 145		21-Mar-22 15:55	1
13C-PCB-81	IS	113	10 - 145		21-Mar-22 15:55	1
13C-PCB-101	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-105	IS	98.4	10 - 145		21-Mar-22 15:55	1
13C-PCB-114	IS	103	10 - 145		21-Mar-22 15:55	1
13C-PCB-118	IS	97.9	10 - 145		21-Mar-22 15:55	1
13C-PCB-123	IS	92.4	10 - 145		21-Mar-22 15:55	1
13C-PCB-126	IS	89.6	10 - 145		21-Mar-22 15:55	1
13C-PCB-153	IS	103	10 - 145		21-Mar-22 15:55	1
13C-PCB-156	IS	104	10 - 145		21-Mar-22 15:55	1
13C-PCB-157	IS	86.8	10 - 145		21-Mar-22 15:55	1
13C-PCB-159	IS	101	10 - 145		21-Mar-22 15:55	1
13C-PCB-167	IS	100	10 - 145		21-Mar-22 15:55	1
13C-PCB-169	IS	104	10 - 145		21-Mar-22 15:55	1
13C-PCB-170	IS	109	10 - 145		21-Mar-22 15:55	1

Sample ID: BCS_13049_PCB	EPA Method 1668C

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-07	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	ZB-1
Date Collected:	22-Feb-22 01:40				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-180	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-188	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-189	IS	115	10 - 145		21-Mar-22 15:55	1
13C-PCB-194	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-206	IS	108	10 - 145		21-Mar-22 15:55	1
13C-PCB-209	IS	108	10 - 145		21-Mar-22 15:55	1
13C-PCB-79	PS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-178	PS	106	10 - 145		21-Mar-22 15:55	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_001 **EPA Method 1668C**

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-01	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	26-Jan-22 18:45				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
Totals						
Total monoCB	6170				21-Mar-22 21:57	1
Total diCB	36000				21-Mar-22 21:57	1
Total triCB	51000				21-Mar-22 21:57	1
Total tetraCB	31600		31700		21-Mar-22 21:57	1
Total pentaCB	8350		8390		21-Mar-22 21:57	1
Total hexaCB	2770		3030		21-Mar-22 21:57	1
Total heptaCB	493		689		21-Mar-22 21:57	1
Total octaCB	21.4		72.7	J	21-Mar-22 21:57	1
Total nonaCB	ND	14.6			21-Mar-22 21:57	1
DecaCB	ND	10.2			21-Mar-22 21:57	1
Total PCB	136000				21-Mar-22 21:57	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-1	IS	28.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-3	IS	45.5	5 - 145		21-Mar-22 21:57	1
13C-PCB-4	IS	63.9	5 - 145		21-Mar-22 21:57	1
13C-PCB-11	IS	78.5	5 - 145		21-Mar-22 21:57	1
13C-PCB-9	IS	89.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-19	IS	91.5	5 - 145		21-Mar-22 21:57	1
13C-PCB-28	IS	77.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-32	IS	112	5 - 145		21-Mar-22 21:57	1
13C-PCB-37	IS	89.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-47	IS	86.7	5 - 145		21-Mar-22 21:57	1
13C-PCB-52	IS	87.6	5 - 145		21-Mar-22 21:57	1
13C-PCB-54	IS	75.1	5 - 145		21-Mar-22 21:57	1
13C-PCB-70	IS	93.3	5 - 145		21-Mar-22 21:57	1
13C-PCB-77	IS	88.9	10 - 145		21-Mar-22 21:57	1
13C-PCB-80	IS	93.7	10 - 145		21-Mar-22 21:57	1
13C-PCB-81	IS	91.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-95	IS	96.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-97	IS	102	10 - 145		21-Mar-22 21:57	1
13C-PCB-101	IS	86.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-104	IS	95.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-105	IS	86.7	10 - 145		21-Mar-22 21:57	1
13C-PCB-114	IS	85.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-118	IS	96.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-123	IS	101	10 - 145		21-Mar-22 21:57	1
13C-PCB-126	IS	66.4	10 - 145		21-Mar-22 21:57	1
13C-PCB-127	IS	86.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-138	IS	87.8	10 - 145		21-Mar-22 21:57	1
13C-PCB-141	IS	92.0	10 - 145		21-Mar-22 21:57	1
13C-PCB-153	IS	102	10 - 145		21-Mar-22 21:57	1
13C-PCB-155	IS	111	10 - 145		21-Mar-22 21:57	1
13C-PCB-156	IS	88.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-157	IS	89.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-159	IS	99.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-167	IS	95.3	10 - 145		21-Mar-22 21:57	1
13C-PCB-169	IS	60.9	10 - 145		21-Mar-22 21:57	1
13C-PCB-170	IS	75.2	10 - 145		21-Mar-22 21:57	1
13C-PCB-180	IS	85.5	10 - 145		21-Mar-22 21:57	1
13C-PCB-188	IS	99.5	10 - 145		21-Mar-22 21:57	1

Sample ID: 1221-831_13049_001 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-01	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	26-Jan-22 18:45				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-189	IS	47.4	10 - 145		21-Mar-22 21:57	1
13C-PCB-194	IS	127	10 - 145		21-Mar-22 21:57	1
13C-PCB-202	IS	110	10 - 145		21-Mar-22 21:57	1
13C-PCB-206	IS	109	10 - 145		21-Mar-22 21:57	1
13C-PCB-208	IS	137	10 - 145		21-Mar-22 21:57	1
13C-PCB-209	IS	91.6	10 - 145		21-Mar-22 21:57	1
13C-PCB-79	PS	99.1	10 - 145		21-Mar-22 21:57	1
13C-PCB-178	PS	120	10 - 145		21-Mar-22 21:57	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_002 **EPA Method 1668C**

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-02	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	27-Jan-22 13:45				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
Totals						
Total monoCB	5560				21-Mar-22 22:58	1
Total diCB	7750				21-Mar-22 22:58	1
Total triCB	6740				21-Mar-22 22:58	1
Total tetraCB	2360		2780		21-Mar-22 22:58	1
Total pentaCB	708		874		21-Mar-22 22:58	1
Total hexaCB	310		330		21-Mar-22 22:58	1
Total heptaCB	54.4		123		21-Mar-22 22:58	1
Total octaCB	ND	24.0			21-Mar-22 22:58	1
Total nonaCB	ND	33.2			21-Mar-22 22:58	1
DecaCB	ND	17.7			21-Mar-22 22:58	1
Total PCB	23500				21-Mar-22 22:58	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-1	IS	58.3	5 - 145		21-Mar-22 22:58	1
13C-PCB-3	IS	79.4	5 - 145		21-Mar-22 22:58	1
13C-PCB-4	IS	81.1	5 - 145		21-Mar-22 22:58	1
13C-PCB-11	IS	91.9	5 - 145		21-Mar-22 22:58	1
13C-PCB-9	IS	83.0	5 - 145		21-Mar-22 22:58	1
13C-PCB-19	IS	92.7	5 - 145		21-Mar-22 22:58	1
13C-PCB-28	IS	76.1	5 - 145		21-Mar-22 22:58	1
13C-PCB-32	IS	106	5 - 145		21-Mar-22 22:58	1
13C-PCB-37	IS	95.7	5 - 145		21-Mar-22 22:58	1
13C-PCB-47	IS	92.4	5 - 145		21-Mar-22 22:58	1
13C-PCB-52	IS	92.8	5 - 145		21-Mar-22 22:58	1
13C-PCB-54	IS	78.9	5 - 145		21-Mar-22 22:58	1
13C-PCB-70	IS	87.7	5 - 145		21-Mar-22 22:58	1
13C-PCB-77	IS	84.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-80	IS	98.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-81	IS	92.5	10 - 145		21-Mar-22 22:58	1
13C-PCB-95	IS	92.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-97	IS	93.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-101	IS	92.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-104	IS	74.1	10 - 145		21-Mar-22 22:58	1
13C-PCB-105	IS	82.9	10 - 145		21-Mar-22 22:58	1
13C-PCB-114	IS	83.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-118	IS	93.6	10 - 145		21-Mar-22 22:58	1
13C-PCB-123	IS	95.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-126	IS	71.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-127	IS	74.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-138	IS	96.3	10 - 145		21-Mar-22 22:58	1
13C-PCB-141	IS	97.8	10 - 145		21-Mar-22 22:58	1
13C-PCB-153	IS	98.4	10 - 145		21-Mar-22 22:58	1
13C-PCB-155	IS	108	10 - 145		21-Mar-22 22:58	1
13C-PCB-156	IS	83.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-157	IS	88.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-159	IS	91.8	10 - 145		21-Mar-22 22:58	1
13C-PCB-167	IS	92.2	10 - 145		21-Mar-22 22:58	1
13C-PCB-169	IS	64.5	10 - 145		21-Mar-22 22:58	1
13C-PCB-170	IS	79.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-180	IS	81.1	10 - 145		21-Mar-22 22:58	1
13C-PCB-188	IS	97.3	10 - 145		21-Mar-22 22:58	1

Sample ID: 1221-831_13049_002 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-02	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	27-Jan-22 13:45				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-189	IS	47.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-194	IS	105	10 - 145		21-Mar-22 22:58	1
13C-PCB-202	IS	101	10 - 145		21-Mar-22 22:58	1
13C-PCB-206	IS	83.6	10 - 145		21-Mar-22 22:58	1
13C-PCB-208	IS	111	10 - 145		21-Mar-22 22:58	1
13C-PCB-209	IS	81.7	10 - 145		21-Mar-22 22:58	1
13C-PCB-79	PS	80.0	10 - 145		21-Mar-22 22:58	1
13C-PCB-178	PS	94.2	10 - 145		21-Mar-22 22:58	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_003 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-03	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	27-Jan-22 19:10				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
Totals						
Total monoCB	5060				21-Mar-22 23:58	1
Total diCB	3370				21-Mar-22 23:58	1
Total triCB	3140				21-Mar-22 23:58	1
Total tetraCB	1970		2060		21-Mar-22 23:58	1
Total pentaCB	743		856		21-Mar-22 23:58	1
Total hexaCB	253				21-Mar-22 23:58	1
Total heptaCB	ND		86.7		21-Mar-22 23:58	1
Total octaCB	ND	29.4			21-Mar-22 23:58	1
Total nonaCB	ND	47.8			21-Mar-22 23:58	1
DecaCB	ND	30.1			21-Mar-22 23:58	1
Total PCB	14500				21-Mar-22 23:58	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-1	IS	48.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-3	IS	64.7	5 - 145		21-Mar-22 23:58	1
13C-PCB-4	IS	66.5	5 - 145		21-Mar-22 23:58	1
13C-PCB-11	IS	67.8	5 - 145		21-Mar-22 23:58	1
13C-PCB-9	IS	76.0	5 - 145		21-Mar-22 23:58	1
13C-PCB-19	IS	80.5	5 - 145		21-Mar-22 23:58	1
13C-PCB-28	IS	86.9	5 - 145		21-Mar-22 23:58	1
13C-PCB-32	IS	93.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-37	IS	94.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-47	IS	79.5	5 - 145		21-Mar-22 23:58	1
13C-PCB-52	IS	68.6	5 - 145		21-Mar-22 23:58	1
13C-PCB-54	IS	71.4	5 - 145		21-Mar-22 23:58	1
13C-PCB-70	IS	77.2	5 - 145		21-Mar-22 23:58	1
13C-PCB-77	IS	75.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-80	IS	80.5	10 - 145		21-Mar-22 23:58	1
13C-PCB-81	IS	76.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-95	IS	81.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-97	IS	77.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-101	IS	74.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-104	IS	78.2	10 - 145		21-Mar-22 23:58	1
13C-PCB-105	IS	79.7	10 - 145		21-Mar-22 23:58	1
13C-PCB-114	IS	82.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-118	IS	81.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-123	IS	82.5	10 - 145		21-Mar-22 23:58	1
13C-PCB-126	IS	67.8	10 - 145		21-Mar-22 23:58	1
13C-PCB-127	IS	83.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-138	IS	100	10 - 145		21-Mar-22 23:58	1
13C-PCB-141	IS	98.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-153	IS	99.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-155	IS	92.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-156	IS	80.3	10 - 145		21-Mar-22 23:58	1
13C-PCB-157	IS	88.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-159	IS	99.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-167	IS	93.8	10 - 145		21-Mar-22 23:58	1
13C-PCB-169	IS	65.2	10 - 145		21-Mar-22 23:58	1
13C-PCB-170	IS	54.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-180	IS	70.9	10 - 145		21-Mar-22 23:58	1
13C-PCB-188	IS	83.4	10 - 145		21-Mar-22 23:58	1

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Sample ID: 1221-831_13049_003 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-03	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	27-Jan-22 19:10				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-189	IS	37.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-194	IS	90.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-202	IS	88.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-206	IS	77.1	10 - 145		21-Mar-22 23:58	1
13C-PCB-208	IS	97.0	10 - 145		21-Mar-22 23:58	1
13C-PCB-209	IS	66.4	10 - 145		21-Mar-22 23:58	1
13C-PCB-79	PS	89.7	10 - 145		21-Mar-22 23:58	1
13C-PCB-178	PS	123	10 - 145		21-Mar-22 23:58	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: 1221-831_13049_004 | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-04	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	27-Jan-22 19:20				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
Totals						
Total monoCB	67.1		92.0		22-Mar-22 00:59	1
Total diCB	626		669		22-Mar-22 00:59	1
Total triCB	749		825		22-Mar-22 00:59	1
Total tetraCB	536		653		22-Mar-22 00:59	1
Total pentaCB	158		254		22-Mar-22 00:59	1
Total hexaCB	52.5		80.1		22-Mar-22 00:59	1
Total heptaCB	ND	8.98			22-Mar-22 00:59	1
Total octaCB	ND	9.54			22-Mar-22 00:59	1
Total nonaCB	ND	12.1			22-Mar-22 00:59	1
DecaCB	ND	8.29			22-Mar-22 00:59	1
Total PCB	2190				22-Mar-22 00:59	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-1	IS	49.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-3	IS	52.0	5 - 145		22-Mar-22 00:59	1
13C-PCB-4	IS	56.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-11	IS	77.0	5 - 145		22-Mar-22 00:59	1
13C-PCB-9	IS	68.1	5 - 145		22-Mar-22 00:59	1
13C-PCB-19	IS	64.1	5 - 145		22-Mar-22 00:59	1
13C-PCB-28	IS	68.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-32	IS	70.2	5 - 145		22-Mar-22 00:59	1
13C-PCB-37	IS	79.9	5 - 145		22-Mar-22 00:59	1
13C-PCB-47	IS	79.8	5 - 145		22-Mar-22 00:59	1
13C-PCB-52	IS	79.9	5 - 145		22-Mar-22 00:59	1
13C-PCB-54	IS	62.0	5 - 145		22-Mar-22 00:59	1
13C-PCB-70	IS	87.6	5 - 145		22-Mar-22 00:59	1
13C-PCB-77	IS	87.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-80	IS	91.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-81	IS	90.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-95	IS	83.4	10 - 145		22-Mar-22 00:59	1
13C-PCB-97	IS	92.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-101	IS	90.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-104	IS	79.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-105	IS	78.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-114	IS	74.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-118	IS	98.0	10 - 145		22-Mar-22 00:59	1
13C-PCB-123	IS	98.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-126	IS	66.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-127	IS	75.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-138	IS	88.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-141	IS	91.4	10 - 145		22-Mar-22 00:59	1
13C-PCB-153	IS	86.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-155	IS	96.1	10 - 145		22-Mar-22 00:59	1
13C-PCB-156	IS	87.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-157	IS	91.3	10 - 145		22-Mar-22 00:59	1
13C-PCB-159	IS	92.6	10 - 145		22-Mar-22 00:59	1
13C-PCB-167	IS	91.7	10 - 145		22-Mar-22 00:59	1
13C-PCB-169	IS	71.8	10 - 145		22-Mar-22 00:59	1
13C-PCB-170	IS	93.5	10 - 145		22-Mar-22 00:59	1
13C-PCB-180	IS	82.9	10 - 145		22-Mar-22 00:59	1
13C-PCB-188	IS	91.7	10 - 145		22-Mar-22 00:59	1

Sample ID: 1221-831_13049_004 **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-04	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	27-Jan-22 19:20				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-189	IS	89.0	10 - 145		22-Mar-22 00:59	1
13C-PCB-194	IS	102	10 - 145		22-Mar-22 00:59	1
13C-PCB-202	IS	107	10 - 145		22-Mar-22 00:59	1
13C-PCB-206	IS	101	10 - 145		22-Mar-22 00:59	1
13C-PCB-208	IS	114	10 - 145		22-Mar-22 00:59	1
13C-PCB-209	IS	106	10 - 145		22-Mar-22 00:59	1
13C-PCB-79	PS	79.2	10 - 145		22-Mar-22 00:59	1
13C-PCB-178	PS	87.1	10 - 145		22-Mar-22 00:59	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

Sample ID: MB_13049_DF/PCB/PAH **EPA Method 1668C**

Client Data		Laboratory Data			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-05	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	22-Feb-22 01:40				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
Totals						
Total monoCB	ND	3.07			21-Mar-22 17:56	1
Total diCB	50.1				21-Mar-22 17:56	1
Total triCB	ND	7.28			21-Mar-22 17:56	1
Total tetraCB	118				21-Mar-22 17:56	1
Total pentaCB	ND	6.01			21-Mar-22 17:56	1
Total hexaCB	ND	3.80			21-Mar-22 17:56	1
Total heptaCB	ND	3.56			21-Mar-22 17:56	1
Total octaCB	ND	2.70			21-Mar-22 17:56	1
Total nonaCB	ND	2.40			21-Mar-22 17:56	1
DecaCB	ND	1.82			21-Mar-22 17:56	1
Total PCB	168				21-Mar-22 17:56	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-1	IS	78.9	5 - 145		21-Mar-22 17:56	1
13C-PCB-3	IS	68.6	5 - 145		21-Mar-22 17:56	1
13C-PCB-4	IS	76.7	5 - 145		21-Mar-22 17:56	1
13C-PCB-11	IS	83.8	5 - 145		21-Mar-22 17:56	1
13C-PCB-9	IS	81.2	5 - 145		21-Mar-22 17:56	1
13C-PCB-19	IS	83.8	5 - 145		21-Mar-22 17:56	1
13C-PCB-28	IS	78.8	5 - 145		21-Mar-22 17:56	1
13C-PCB-32	IS	90.4	5 - 145		21-Mar-22 17:56	1
13C-PCB-37	IS	81.9	5 - 145		21-Mar-22 17:56	1
13C-PCB-47	IS	80.2	5 - 145		21-Mar-22 17:56	1
13C-PCB-52	IS	80.3	5 - 145		21-Mar-22 17:56	1
13C-PCB-54	IS	68.5	5 - 145		21-Mar-22 17:56	1
13C-PCB-70	IS	83.5	5 - 145		21-Mar-22 17:56	1
13C-PCB-77	IS	81.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-80	IS	84.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-81	IS	80.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-95	IS	88.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-97	IS	91.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-101	IS	80.8	10 - 145		21-Mar-22 17:56	1
13C-PCB-104	IS	87.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-105	IS	79.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-114	IS	86.2	10 - 145		21-Mar-22 17:56	1
13C-PCB-118	IS	94.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-123	IS	85.2	10 - 145		21-Mar-22 17:56	1
13C-PCB-126	IS	75.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-127	IS	73.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-138	IS	89.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-141	IS	92.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-153	IS	75.1	10 - 145		21-Mar-22 17:56	1
13C-PCB-155	IS	101	10 - 145		21-Mar-22 17:56	1
13C-PCB-156	IS	91.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-157	IS	90.7	10 - 145		21-Mar-22 17:56	1
13C-PCB-159	IS	91.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-167	IS	94.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-169	IS	81.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-170	IS	92.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-180	IS	76.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-188	IS	92.4	10 - 145		21-Mar-22 17:56	1

Sample ID: MB_13049_DF/PCB/PAH **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-05	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	22-Feb-22 01:40				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-189	IS	83.6	10 - 145		21-Mar-22 17:56	1
13C-PCB-194	IS	88.9	10 - 145		21-Mar-22 17:56	1
13C-PCB-202	IS	104	10 - 145		21-Mar-22 17:56	1
13C-PCB-206	IS	75.7	10 - 145		21-Mar-22 17:56	1
13C-PCB-208	IS	89.4	10 - 145		21-Mar-22 17:56	1
13C-PCB-209	IS	79.5	10 - 145		21-Mar-22 17:56	1
13C-PCB-79	PS	80.0	10 - 145		21-Mar-22 17:56	1
13C-PCB-178	PS	88.4	10 - 145		21-Mar-22 17:56	1

EDL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

Sample ID: BCS_13049_PCB | **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-07	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	22-Feb-22 01:40				

Analyte	Conc. (pg/Sample)	EDL	EMPC	Qualifiers	Analyzed	Dilution
Totals						
Total monoCB	16000				21-Mar-22 15:55	1
Total diCB	64500				21-Mar-22 15:55	1
Total triCB	131000				21-Mar-22 15:55	1
Total tetraCB	216000				21-Mar-22 15:55	1
Total pentaCB	239000				21-Mar-22 15:55	1
Total hexaCB	217000				21-Mar-22 15:55	1
Total heptaCB	121000				21-Mar-22 15:55	1
Total octaCB	72300				21-Mar-22 15:55	1
Total nonaCB	15800				21-Mar-22 15:55	1
DecaCB	5150				21-Mar-22 15:55	1
Total PCB	1080000				21-Mar-22 15:55	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-1	IS	102	5 - 145		21-Mar-22 15:55	1
13C-PCB-3	IS	103	5 - 145		21-Mar-22 15:55	1
13C-PCB-4	IS	100	5 - 145		21-Mar-22 15:55	1
13C-PCB-11	IS	101	5 - 145		21-Mar-22 15:55	1
13C-PCB-9	IS	97.2	5 - 145		21-Mar-22 15:55	1
13C-PCB-19	IS	100	5 - 145		21-Mar-22 15:55	1
13C-PCB-28	IS	98.2	5 - 145		21-Mar-22 15:55	1
13C-PCB-32	IS	105	5 - 145		21-Mar-22 15:55	1
13C-PCB-37	IS	107	5 - 145		21-Mar-22 15:55	1
13C-PCB-47	IS	108	5 - 145		21-Mar-22 15:55	1
13C-PCB-52	IS	107	5 - 145		21-Mar-22 15:55	1
13C-PCB-54	IS	104	5 - 145		21-Mar-22 15:55	1
13C-PCB-70	IS	111	5 - 145		21-Mar-22 15:55	1
13C-PCB-77	IS	97.0	10 - 145		21-Mar-22 15:55	1
13C-PCB-80	IS	113	10 - 145		21-Mar-22 15:55	1
13C-PCB-81	IS	113	10 - 145		21-Mar-22 15:55	1
13C-PCB-95	IS	97.8	10 - 145		21-Mar-22 15:55	1
13C-PCB-97	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-101	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-104	IS	99.5	10 - 145		21-Mar-22 15:55	1
13C-PCB-105	IS	98.4	10 - 145		21-Mar-22 15:55	1
13C-PCB-114	IS	103	10 - 145		21-Mar-22 15:55	1
13C-PCB-118	IS	97.9	10 - 145		21-Mar-22 15:55	1
13C-PCB-123	IS	92.4	10 - 145		21-Mar-22 15:55	1
13C-PCB-126	IS	89.6	10 - 145		21-Mar-22 15:55	1
13C-PCB-127	IS	97.6	10 - 145		21-Mar-22 15:55	1
13C-PCB-138	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-141	IS	106	10 - 145		21-Mar-22 15:55	1
13C-PCB-153	IS	103	10 - 145		21-Mar-22 15:55	1
13C-PCB-155	IS	115	10 - 145		21-Mar-22 15:55	1
13C-PCB-156	IS	104	10 - 145		21-Mar-22 15:55	1
13C-PCB-157	IS	86.8	10 - 145		21-Mar-22 15:55	1
13C-PCB-159	IS	101	10 - 145		21-Mar-22 15:55	1
13C-PCB-167	IS	100	10 - 145		21-Mar-22 15:55	1
13C-PCB-169	IS	104	10 - 145		21-Mar-22 15:55	1
13C-PCB-170	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-180	IS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-188	IS	109	10 - 145		21-Mar-22 15:55	1

Sample ID: BCS_13049_PCB **EPA Method 1668C**

Client Data		**Laboratory Data**			
Name:	Enthalpy Analytical, LLC	Lab Sample:	2203071-07	Date Received:	07-Mar-22 09:45
Project:	Ecolube / RTO #1 Outlet / 006AS-011833	QC Batch:	B22C199	Date Extracted:	21-Mar-22
Matrix:	Air			Column:	
Date Collected:	22-Feb-22 01:40				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-PCB-189	IS	115	10 - 145		21-Mar-22 15:55	1
13C-PCB-194	IS	102	10 - 145		21-Mar-22 15:55	1
13C-PCB-202	IS	106	10 - 145		21-Mar-22 15:55	1
13C-PCB-206	IS	108	10 - 145		21-Mar-22 15:55	1
13C-PCB-208	IS	111	10 - 145		21-Mar-22 15:55	1
13C-PCB-209	IS	108	10 - 145		21-Mar-22 15:55	1
13C-PCB-79	PS	109	10 - 145		21-Mar-22 15:55	1
13C-PCB-178	PS	106	10 - 145		21-Mar-22 15:55	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
RL	For 537.1, the reported RLs are the MRLs.
TEQ	Toxic Equivalency, sum of the toxic equivalency factors (TEF) multiplied by the sample concentrations.
TEQMax	TEQ calculation that uses the detection limit as the concentration for non-detects
TEQMin	TEQ calculation that uses zero as the concentration for non-detects
TEQRisk	TEQ calculation that uses ½ the detection limit as the concentration for non-detects
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	21-023-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2020018
Massachusetts Department of Environmental Protection	M-CA413
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	2211390
New Hampshire Environmental Accreditation Program	207721
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Ohio Environmental Protection Agency	87778
Oregon Laboratory Accreditation Program	4042-021
Pennsylvania Department of Environmental Protection	018
Texas Commission on Environmental Quality	T104704189-22-13
Vermont Department of Health	VT-4042
Virginia Department of General Services	11276
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p- Dioxins & Polychlorinated Dibenzofurans	EPA 23
Polychlorinated Dibenzodioxins in Ambient Air by GC/HRMS	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	PFAS Isotope Dilution
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613/1613B
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	PFAS Isotope Dilution
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537.1
Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry	EPA 533
Perfluorooctanesulonate (PFOS) and Perfluorooctanoate (PFOA) - Method for Unfiltered Samples Using Solid Phase Extraction and Liquid Chromatography/Mass Spectrometry	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	PFAS Isotope Dilution
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	PFAS Isotope Dilution
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

COPY

MONTROSE AIR QUALITY SERVICES

CHAIN OF COUSTODY

(Acetone/Toluene Rinses) Fedex, 7759 2882 0134, cooler, on ice, no seals, good condition DK 2/2/22 11:15 4.2° T9

Portland Location (Impinger Rinses) Fedex, 7759 2881 9840, cooler, on ice, no seals, good condition DK 2/2/22 11:15 3.7° T9
13585 NE Whitaker Way
Portland, OR 97230 (Traps/Filters)
Phone (503) 255-5050 | Fax (503) 255-0505 Fedex, 7759 1713 7497, cooler, blue ice, no seals, good condition

1221-831

Lab info: 2203071 10.7°C Enthalpy

DK 2/1/22

Client / Project:	Project / Sample Location:	Test / Analytical Method:
Ecolube	RTO #1 Outlet	Revised Method 23 per Enthalpy SOPs
Project No.: 006AS-011833	**Purchase Order No:**	**Special Analysis / Detection Limit / Reporting Instructions:** Each dioxin&furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners, plus each PCB congener and PAH and PAN-derivative listed. Chlorobenzene and chlorophenol. List is attached to this COC.
Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com jheffernan@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
R1 Filter	1/26/22	1845	1			Cooler
R1 Ace & Tolu	1/26/22	1845	1		Acetone and Toluene	
R1 XAD Trap	1/26/22	1845	1			Cooler
R1 Imp Cont & Rinse	1/26/22	1845	1		H2O, Acetone and Toluene	
R2 Filter	1/27/22	1345	1			Cooler
R2 Ace & Tolu	1/27/22	1345	1		Acetone and Toluene	
R2 XAD Trap	1/27/22	1345	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
R3 Filter	1/27/22	1910	2			Cooler
R3 Ace & Tolu	1/27/22	1910	1		Acetone and Toluene	
R3 XAD Trap	1/27/22	1910	1			Cooler
R3 Imp Cont & Rinse	1/27/22	1910	1		H2O, Acetone and Toluene	
FPB Filter	1/27/22	1920	1			Cooler
FPB Ace & Tolu	1/27/22	1920	1		Acetone and Toluene	
FPB XAD Trap	1/27/22	1920	1			Cooler
FPB Imp Cont & Rinse	1/27/22	1920	1		H2O, Acetone and Toluene	
Total Containers			17			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
[signature]	1/31/22	1111	[signature]	2/1/22	11:30	10.6° T9
[signature]	2/25/22	1130	[signature]	03/07/22	0945	10.7°C

Key: PCDD = Polychlorinated Dibenzo-p-Dioxin, PCDF = Polychlorinated Dibenzofuran, FB = Field Blank, RB = Reagent Blank

2203071 10.7°C

Matrix: air	Batch #: 13049			Extraction Cycle Times
Extraction Type:		Init.	Date	Start: 1:40 Stop: 9:00 Start Date: 2/22/22 HEX
☐SDS ☐SPE ☐Liq-Liq ☐SEP	Extraction	OK/B	2/22/22	Start: 2:30 Stop: 9:00 Start Date: 2/23/22 TOL
☑PCDD/F ☑PCB ☑PAH	Clean Up	OK/B	2/24/22	Start: — Stop: — Start Date: —
☐Other:	Transfer	OK/B	2/24/22	Split: 1/2 1/4 * Final Volume: 20 µL — DF PCB/PAH — 100 µL

Lab Sample ID	QC Type	Wt. (g)/Vol. (mL)	Extr. Pos.#	Observations	pH
1221-831_13049_001	--------	443.9 —	3	—	1
1221-831_13049_002	--------	412.5 —	4	—	1
1221-831_13049_003	--------	420.7 —	5	—	1
1221-831_13049_004	--------	258.4 —	6	—	5
MB_13049_DF/PCB/PAH	--------	—	1	—	n/a
LCS_13049_DF/PCB/PAH	--------	—	2	—	n/a
BCS_13049_DF	--------	—	—	—	n/a
BCS_13049_PCB	--------	—	—	—	n/a
BCS_13049_PAH	--------	—	—	—	n/a

OK 2/24/22

MS Parent Sample (if used)
—

Supply IDs			Supply IDs (Continued)			Equipment IDs	
Item	Supplier	Lot/Prep ID	Item	Supplier	Lot/ Prep ID	Balance	1
Toluene	Fisher	216631	Cl Strips	—	—	Pipettes	P25, P18, P16
Acid Silica	—	EUPrep 2-22-1	pH Strips	Merck	HC157843		
Base Silica	—	EUPrep 2-11-8	Sox filter	Millipore	R1EB97823		
Silica	Acros	A0391958	Glass wool	—	14721999		
Florisil	Sigma	57209	—	—	—		
Hexane	Fisher	213778					
CH_2Cl_2	Fisher	214276					
Tetradecane	—	STBK2282					
Na_2SO_4	Merck	17B155209					
$AgNO_3$	—	EUPrep 2-22-7					
Hydromatrix	—	—					
H2SO4	—	—					

Comments: * Note: M0010 FV=1000µL B 2/24/22

OK 2/26/22

Reviewer Initials / Date: ____________ EU083_v1 (Air Sample Observations)

2203071

Air Sample Fraction Observations					
		Init.	Date	ENTHALPY ANALYTICAL	
Extraction Prep:	13049	DK	2/22/22		

Lab Sample ID	XAD	Filter(s)	Rinses	Glasswool	Other
1221-831-001	YW on top, S	BK, B	BK PM	WH, W	—
1221-831-002	YW on top, S	BK	BK PM	WH, W	—
1221-831-003	WH, S	BK, B	BK PM	WH, W	—
1221-831-004	WH, F	WH, C	BK PM	WH, D	—

DK 2/22/22

COMMON OBSERVATION ABBREVIATIONS
B = BULLSEYE
BE = BEIGE
BK = BLACK
C = CLEAN
D = DRY
F = FREE FLOWING
GY = GREY
M = MOIST
PM = PARTICULATES
S = STICKY
W = WET
WH = WHITE
YW = YELLOW

Comments:
Note: All samples have a fuel smell. B 2/22/22

1221-831_**MB**
MAQS-Portland, OR
Prep Date: 01/05/2022
DF/PAH/PCB

Alicia Kyger 2/22/22

Reviewer Initials / Date: ____________

EU083_v1 (Air Sample Observations)

2203071

Spike Profile Sheet	ENTHALPY ANALYTICAL
Batch#: 13049	

Comments: ~~—~~ Bn 2/25/22

NOTE: ALL Ax STANDARDS SOLUTIONS ARE ONLY SPIKED INTO BCS, LCS, OPR AND/OR MS/MSD

PCDD/F

ES: 40 µL @ 100pg/uL	Ax-A: 40 µL @ 10pg/uL	Ax-B: 40 µL @ 10pg/uL	AS: 40 µL @ 100pg/uL
ID: SID0443	ID: SIDAJ57	ID: SIDAK50	ID: SIDAN71
Exp.: AUG 2028	Exp.: APR 2026	Exp.: OCT 2025	Exp.: AUG 2023
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/24/22
Witness: — Date: —	Witness: — Date: —	Witness: — Date: —	Witness: — Date: —
~~CS: µL @~~ Bn 2/22/22	JS: 20 µL @ 100 pg/uL	~~µL @~~ Bn 2/24/22	~~µL @~~
~~ID:~~	ID: SIDAJ60	~~ID:~~	~~ID:~~
~~Exp.:~~	Exp.: APR 2026	~~Exp.:~~	~~Exp.:~~
~~Spiker:~~	Spiker: Bn 2/24/22	~~Spiker:~~	~~Spiker:~~
~~Witness: Date:~~	Witness: — Date: —	~~Witness: Date:~~	~~Witness: Date:~~

EE Bn 2/22/22

NS:

PCB

EE Bn 2/22/22

~~ES:~~ 10 µL @ 0.5-2.0ng/mL	~~Ax1668/209~~: IS: 10 µL @ 1 ng/mL		~~CS: µL @~~ Bn 2/22/22
ID: SID0596	ID: SID0595		~~ID:~~
Exp.: 6/21/22	Exp.: 5/14/22		~~Exp.:~~
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22		~~Spiker:~~
Witness: — Date: —	Witness: — Date: —		~~Witness: Date:~~
~~JS: µL @~~	~~FS: µL @~~ Bn 2/24/22	~~: µL @~~	
~~ID:~~	~~ID:~~	~~ID:~~	
~~Exp.:~~	~~Exp.:~~	~~Exp.:~~	
~~Spiker:~~	~~Spiker:~~	~~Spiker:~~	
~~Witness: Date:~~	~~Witness: Date:~~	~~Witness: Date:~~	

PAH

ES: 80 µL @ 500pg/uL	Ax: 80 µL @ 500pg/uL	AS: 80 µL @ 500pg/uL	~~CS: µL @~~ Bn 2/22/22
ID: SIDA051	ID: SIDAK59	ID: SIDAN47	~~ID:~~
Exp.: NOV 2022	Exp.: MAY 2022	Exp.: JUL 2022	~~Exp.:~~
Spiker: Bn 2/22/22	Spiker: Bn 2/22/22	Spiker: Bn 2/24/22	~~Spiker:~~
Witness: — Date: —	Witness: — Date: —	Witness: — Date: —	~~Witness: Date:~~
JS: 80 µL @ 125pg/uL	~~µL @~~ Bn 2/24/22	8270 MegaMix: $\boxed{250\,uL}$ at 1000ug/mL	8270 Acid surr.: $\boxed{25\,uL}$ at 10,000ug/mL
ID: SIDAN48	~~ID:~~	ID: SID0639	ID: SID0628
Exp.: JUL 2022	~~Exp.:~~	Exp: 3/2023	Exp: 10/2026
Spiker: Bn 2/24/22	~~Spiker:~~	spiker: Bn 2/22/22	spiker: Bn 2/22/22
Witness: — Date: —	~~Witness: Date:~~		

Reviewer Initials / Date: ______________________ EU083_v1 (Air Sample Observations)

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2203071 TAT std

Samples Arrival:	**Date/Time** 03/07/22 0945		**Initials:** WWS		**Location:** WR-2 **Shelf/Rack:** N/A	
Delivered By:	FedEx	UPS	On Trac	GLS	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice		Techni Ice	Dry Ice	None
Temp °C: 10.7 (uncorrected)		**Probe used:** Y / N		**Thermometer ID:** DT-3		
Temp °C: 10.7 (corrected)						

					YES	NO	NA
Shipping Container(s) Intact?					✓		
Shipping Custody Seals Intact?							✓
Airbill —	Trk # 7761 9894 6528				✓		
Shipping Documentation Present?					✓		
Shipping Container	Vista	Client	Retain	Return		Dispose	
Chain of Custody / Sample Documentation Present?					✓		
Chain of Custody / Sample Documentation Complete?					✓		
Holding Time Acceptable?					✓		
Logged In:	**Date/Time** 03/09/22 0815	**Initials:** WWS	**Location:** R-9 **Shelf/Rack:** N/A				
COC Anomaly/Sample Acceptance Form completed?						✓	✓

Comments:

CoC/Label Reconciliation Report WO# 2203071

LabNumber	CoC Sample ID		sample label	SampleAlias	Sample Date/Time			Container	BaseMatrix	Sample Comments
2203071-01	A 1221-831_13049_001	☑	1221-831_001 Batch 13049 PCB	R1	26-Jan-22 18:45	☐	(a) (c)	~~HDPE 15mL Tube~~ (D)	Air	
2203071-02	A 1221-831_13049_002	☑	_002	R2	27-Jan-22 13:45	☐		HDPE 15mL Tube	Air	
2203071-03	A 1221-831_13049_003	☑	_003	R3	27-Jan-22 19:10	☐		HDPE 15mL Tube	Air	
2203071-04	A 1221-831_13049_004	☑	_004	FPB	27-Jan-22 19:20	☐		HDPE 15mL Tube	Air	
2203071-05	A MB_13049_DF/PCB/PAH	☑	MB Batch 13049 PCB		22-Feb-22 01:40	☐	(B)	HDPE 15mL Tube	Air	
2203071-06	A LCS_13049_DF/PCB/PAH	☑	LCS Batch 13049 PCB		22-Feb-22 01:40	☐		HDPE 15mL Tube	Air	
2203071-07	A BCS_13049_PCB	☑	1221-831_BCS mass-Portland,OR Batch 13049 PCB		22-Feb-22 01:40	☐		~~HDPE 15mL Tube~~	Air	

WWS 03/10/22

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Adequate Sample Volume?	✓		
Container Type Appropriate for Analysis(es)	✓		

Comments:
(a) used sample collection date/time
(B) used extraction start date/time
(c) no collection/extraction date/time listed on sample
(D) received in clear glass ~~vial~~ ampule inside of HDPE 15mL tube WWS 03/10/22

Preservation Documented: Na2S2O3 Trizma NH4CH3CO2 None Other

Verifed by/Date: WWS 03/10/22

APPENDIX D
QUALITY ASSURANCE/QUALITY CONTROL

Appendix D.1
Units and Abbreviations

MONTROSE AIR QUALITY SERVICES

UNITS AND ABBREVIATIONS

@ X% O_2	corrected to X% oxygen (corrected for dilution air)
|CC|	absolute value of the confidence coefficient
|d|	absolute value of the mean differences
ºC	degrees Celsius (centrigade)
ºF	degrees Fahrenheit
ºR	degrees Rankine
" H_2O	inches of water column
13.6	specific gravity of mercury
ΔH	pressure drop across orifice meter, inches H_2O
ΔP	velocity head of stack gas, inches H_2O
θ	total sampling time, minutes
µg	microgram
ρ_a	density of acetone, mg/ml
ρ_w	density of water, 0.9982 g/ml or 0.002201 lb/ml
acfm	actual cubic feet of gas per minute at stack conditions
A_n	cross-sectional area of nozzle, ft^2
A_s	cross-sectional area of stack, square feet (ft^2)
Btu	British thermal unit
B_{ws}	proportion by volume of water vapor in gas stream
C_a	particulate matter concentration in stack gas, gr/acf
C_{Avg}	average unadjusted gas concentration, ppmv
C_{Dir}	measured concentration of calibration gas, ppmv
cf or ft^3	cubic feet
cfm	cubic feet per minute
C_{Gas}	average gas concentration adjusted for bias, ppmv
C_M	average of initial and final system bias check responses from upscale calibration gas, ppmv
cm or m^3	cubic meters
C_{MA}	actual concentration of the upscale calibration gas, ppmv
C_O	average of initial and final system bias check responses from low-level calibration gas, ppmv
C_p	pitot tube coefficient
C_s	particulate matter concentration in stack gas, gr/dscf
CS	calibration span, % or ppmv
C_S	measured concentration of calibration gas, ppmv
C_V	manufactured certified concentration of calibration gas, ppmv
D	drift assessment, % of span
dcf	dry cubic feet
dcm	dry cubic meters
D_n	diameter of nozzle, inches
D_s	diameter of stack, inches
dscf	dry standard cubic feet
dscfm	dry standard cubic feet per minute
dscm	dry standard cubic meters
F_d	F-factor, dscf/MMBtu of heat input
fpm	feet per minute
fps	feet per second
ft	feet
ft^2	square feet
g	gram
gal	gallons
gr	grains (7000 grains per pound)

UNITS AND ABBREVIATIONS

gr/dscf	grains per dry standard cubic feet
hr	hour
I	percent of isokinetic sampling
in	inch
k	kilo or thousand (metric units, multiply by 10^3)
K	kelvin (temperature)
K_3	conversion factor 0.0154 gr/mg
K_4	conversion factor 0.002669 ((in. Hg)(ft^3))/((ml)(°R))
kg	kilogram
K_p	pitot tube constant (85.49 ft/sec)
kwscfh	thousand wet standard cubic feet per hour
l	liters
lb/hr	pounds per hour
lb/MMBtu	pounds per million Btu
lpm	liters per minute
m	meter or milli
M	thousand (English units) or mega (million, metric units)
m^3	cubic meters
m_a	mass of residue of acetone after evaporation, mg
M_d	molecular weight of stack gas; dry basis, lb/lb-mole
meq	milliequivalent
mg	milligram
Mg	megagram (10^6 grams)
min	minute
ml or mL	milliliter
mm	millimeter
MM	million (English units)
MMBtu/hr	million Btu per hour
m_n	total amount of particulate matter collected, mg
mol	mole
mol. wt. or MW	molecular weight
M_s	molecular weight of stack gas; wet basis, lb/lb-mole
MW	molecular weight or megawatt
n	number of data points
ng	nanogram
nm	nanometer
P_{bar}	barometric pressure, inches Hg
pg	picogram
P_g	stack static pressure, inches H_2O
P_m	barometric pressure of dry gas meter, inches Hg
ppb	parts per billion
ppbv	parts per billion, by volume
ppbvd	parts per billion by volume, dry basis
ppm	parts per million
ppmv	parts per million, by volume
ppmvd	parts per million by volume, dry basis
P_s	absolute stack gas pressure, inches Hg
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
P_{std}	standard absolute pressure, 29.92 inches Hg
Q_a	volumetric flow rate, actual conditions, acfm

UNITS AND ABBREVIATIONS

Q_s	volumetric flow rate, standard conditions, scfm
Q_{std}	volumetric flow rate, dry standard conditions, dscfm
R	ideal gas constant 21.85 ((in. Hg) ($ft^{3)}$)/((°R) (lbmole))
SB_{final}	post-run system bias check, % of span
SB_i	pre-run system bias check, % of span
scf	standard cubic feet
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
scm	standard cubic meters
scmh	standard cubic meters per hour
sec	second
sf, sq. ft., or ft^2	square feet
std	standard
t	metric ton (1000 kg)
$T_{0.975}$	t-value
T_a	absolute average ambient temperature, ºR (+460 for English)
T_m	absolute average dry gas meter temperature, ºR (+460 for English)
ton or t	ton = 2000 pounds
tph or tons/hr	tons per hour
tpy or tons/yr	tons per year
T_s	absolute average stack gas meter temperature, ºR (+460 for English)
T_{std}	absolute temperature at standard conditions
V	volt
V_a	volume of acetone blank, ml
V_{aw}	volume of acetone used in wash, ml
V_{lc}	total volume H_2O collected in impingers and silica gel, grams
V_m	volume of gas sampled through dry gas meter, ft^3
$V_{m(std)}$	volume of gas measured by the dry gas meter, corrected to standard conditions, dscf
V_{ma}	stack gas volume sampled, acf
V_n	volume collected at stack conditions through nozzle, acf
V_s	average stack gas velocity, feet per second
$V_{wc(std)}$	volume of water vapor condensed, corrected to standard conditions, scf
$V_{wi(std)}$	volume of water vapor in gas sampled from impingers, scf
$V_{wsg(std)}$	volume of water vapor in gas sampled from silica gel, scf
W	watt
W_a	weight of residue in acetone wash, mg
W_{imp}	total weight of impingers, grams
W_{sg}	total weight of silica gel, grams
Y	dry gas meter calibration factor, dimensionless

ACRONYMS

AAS	atomic absorption spectroscopy
ACDP	air contaminant discharge permit
ACE	analyzer calibration error, percent of span
AD	absolute difference
ADL	above detection limit
AETB	Air Emissions Testing Body
AS	applicable standard (emission limit)
ASTM	American Society For Testing And Materials
BACT	best achievable control technology
BDL	below detection limit
BHP	brake horsepower
BIF	boiler and industrial furnace
BLS	black liquor solids
CC	confidence coefficient
CD	calibration drift
CE	calibration error
CEM	continuous emissions monitor
CEMS	continuous emissions monitoring system
CERMS	continuous emissions rate monitoring system
CET	calibration error test
CFR	Code of Federal Regulations
CGA	cylinder gas audit
CHNOS	elemental analysis for determination of C, H, N, O, and S content in fuels
CNCG	concentrated non-condensable gas
CO	catalytic oxidizer
COC	chain of custody
COMS	continuous opacity monitoring system
CPM	condensible particulate matter
CPMS	continuous parameter monitoring system
CT	combustion turbine
CTM	conditional test method
CTO	catalytic thermal oxidizer
CVAAS	cold vapor atomic absorption spectroscopy
D_e	equivalent diameter
DE	destruction efficiency
Dioxins	polychlorinated dibenzo-p-dioxins (pcdd's)
DLL	detection level limited
DNCG	dilute non-condensable gas
ECD	electron capture detector
EIT	Engineer In Training
ELCD	electoconductivity detector (hall detector)
EMPC	estimated maximum possible concentration
EPA	US Environmental Protection Agency
EPRI	Electric Power Research Institute
ES	emission standard (applicable limit)
ESP	electrostatic precipitator
EU	emission unit
FCCU	fluid catalytic cracking unit
FGD	flue gas desulfurization
FI	flame ionization
FIA	flame ionization analyzer
FID	flame ionization detector
FPD	flame photometric detector
FPM	filterable particulate matter

ACRONYMS

FTIR	Fourier-transform infrared spectroscopy
FTPB	field train proof blank
FTRB	field train recovery blank
Furans	polychlorinated dibenzofurans (pcdf's)
GC	gas chromatography
GC/MS	gas chromatography/mass spectroscopy
GFAAS	graphite furnace atomic absorption spectroscopy
GFC	gas filter correlation
GHG	greenhouse gas
HAP	hazardous air pollutant
HC	hydrocarbons
HHV	higher heating value
HPLC	high performance liquid chromatography
HRGC/HRMS	high-resolution gas chromatography/high-resolution mass spectroscopy
HRSG	heat recovery steam generator
IC	ion chromatography
ICAP	inductively-coupled argon plasmography
ICPCR	ion chromatography with a post-column reactor
IR	infrared radiation
ISO	International Standards Organization
kW	kilowatts
LFG	landfill gas
LHV	lower heating value
LPG	liquified petroleum gas
MACT	maximum achievable control technology
MDI	methylene diphyenyl diisocyanate
MDL	method detection limit
MNOC	maximum normal operating conditions
MRL	method reporting limit
MS	mass spectrometry
NA	not applicable or not available
NCASI	National Council For Air And Steam Improvement
NCG	non-condensable gases
NDIR	non-dispersive infrared
NESHAP	National Emissions Standards For Hazardous Air Pollutants
NG	natural gas
NIOSH	National Institute For Occupational Safety And Health
NIST	National Institute Of Standards And Technology
NMC	non-methane cutter
NMOC	non-methane organic compounds
NMVOC	non-methane volatile organic compounds
NPD	nitrogen phosphorus detector
NSPS	New Source Performance Standards
OSHA	Occupational Safety And Health Administration
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl compounds
PCWP	plywood and composite wood products
PE	Professional Engineer
PFAS	per- and polyfluoroalkyl substances (PFAS)
PI	photoionization
PID	photoionization detector
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in aerodynamic diameter

ACRONYMS

POM	polycyclic organic matter
PS	performance specification
PSD	particle size distribution
PSEL	plant site emission limits
PST	performance specification test
PTE	permanent total enclosure
PTM	performance test method
QA/QC	quality assurance and quality control
QI	Qualified Individual
QSTI	Qualified Source Testing Individual
RA	relative accuracy
RAA	relative accuracy audit
RACT	reasonably available control technology
RATA	relative accuracy test audit
RCTO	rotary concentrator thermal oxidizer
RICE	stationary reciprocating internal combustion engine
RM	reference method
RTO	regenerative thermal oxidizer
SAM	sulfuric acid mist
SCD	sulfur chemiluminescent detector
SCR	selective catalytic reduction system
SD	standard deviation
Semi-VOST	semivolatile organic compounds sample train
SRM	standard reference material
TAP	toxic air pollutant
TBD	to be determined
TCA	thermal conductivity analyzer
TCD	thermal conductivity detector
TGNENMOC	total gaseous non-ethane non-methane organic compounds
TGNMOC	total gaseous non-methane organic compounds
TGOC	total gaseous organic compounds
THC	total hydrocarbons
TIC	tentatively identified compound
TO	thermal oxidizer
TO	toxic organic (as in EPA Method TO-15)
TPM	total particulate matter
TSP	total suspended particulate matter
TTE	temporary total enclosure
ULSD	ultra-low sulfur diesel
UV	ultraviolet radiation range
VE	visible emissions
VOC	volatile organic compounds
VOST	volatile organic sample train
WC	water column
WWTP	waste water treatment plant

CHEMICAL NOMENCLATURE

Ag	silver
As	arsenic
Ba	barium
Be	beryllium
C	carbon
Cd	cadmium
CdS	cadmium sulfide
CH_2O	formaldehyde
CH_3CHO	acetaldehyde
CH_3OH	methanol
CH_4	methane
C_2H_4O	ethylene oxide
C_2H_6	ethane
C_3H_4O	acrolein
C_3H_6O	propionaldehyde
C_3H_8	propane
C_6H_5OH	phenol
Cl_2	chlorine
ClO_2	chlorine dioxide
CO	carbon monoxide
Co	cobalt
CO_2	carbon dioxide
Cr	chromium
Cu	copper
EtO	ethylene oxide
EtOH	ethyl alcohol (ethanol)
H_2	hydrogen
H_2O	water
H_2O_2	hydrogen peroxide
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
HCl	hydrogen chloride
Hg	mercury
IPA	isopropyl alcohol
MDI	methylene diphyenyl diisocyanate
MEK	methyl ethyl ketone
MeOH	methanol
Mn	manganese
N_2	nitrogen
NH_3	ammonia
Ni	nickel
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
O_2	oxygen
P	phosphorus
Pb	lead
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
Sb	antimony
Se	selenium
SO_2	sulfur dioxide
SO_3	sulfur trioxide
SO_x	sulfur oxides
TCDD	tetrachlorodibenzodioxin
TCDF	tetrachlorodibenzofuran
TGOC	total gaseous organic concentration
THC	total hydrocarbons
Tl	thallium
TRS	total reduced sulfur compounds
Zn	zinc

Appendix D.2
Manual Test Method QA/QC Data

MONTROSE ENVIRONMENTAL

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice, Leak Check, and Thermocouple Calibration Check
English Meter Box Units, English K' Factor

Meter box ID:	MB31
Meter ID (if applicable):	METER ID
Orifice set ID:	TV1
Calibrated by:	AG
Expires:	**5/19/22**

Date:	11/19/21
Location:	Portland
No. of orifices used (min. 3)	3
Barometric pressure (in. Hg):	30.26 in. Hg
Theoretical critical vacuum	14.27 in. Hg

Yd:	0.9902
ΔH@:	1.8162

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.78	15.00	69.645	77.203	7.558	XX	61	XX	61	51	0.3857	21.0	61	61	61.0
1.30	9.00	77.203	82.838	5.635	XX	61	XX	61	56	0.4819	19.0	61	61	61.0
2.40	7.00	82.838	88.710	5.872	XX	61	XX	XX	65	0.6450	17.0	61	61	61.0

— SAMPLE RATE — INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.78	0.511
1.30	0.639
2.40	0.855

— DRY GAS METER — VOLUME CORRECTED

Vm(std) (cu ft)
7.758
5.792
6.051

—— ORIFICE ——

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
7.670	7.486
5.750	5.612
5.986	5.842

— DRY GAS METER — CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.9887	-0.002
0.9927	0.003
0.9892	-0.001

—— ORIFICE —— CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
1.720	-0.096
1.836	0.020
1.892	0.076

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	0.9902
Average ΔH@	1.8162
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6	Should be 5-7 in. H_2O
Leak Rate, (in H_2O/min):	0	Must be zero (manometer level stable for 1 minute)

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	25	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Meter Box Thermocouple Readout Calibration Check

Input Temperature	Allowable Temp. Dev.*
25	7
75	8
125	9
250	11
350	12
500	14

Stack	Probe	Filter	Exit	Aux.	Meter In	Meter Out
25	24	25	23	28	25	25
75	77	77	75	77	74	78
126	125	126	125	125	126	125
248	253	250				
350	351	347				
498						
XX						
XX						

Thermocouple simulator	
Make/Model:	Omega CL300
Serial No.	647
Cal Date:	1/10/2020

Meter Thermocouple Calibration

Ref. Temp	Allowable Temp. Dev.*	Meter In	Meter Out
61.5	8	61	62
61.5	8	62	63

Reference Thermometer	
Make/Model:	Traceable
Serial No.	170865315
Cal Date:	6/16/2020

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Austin Goracke Signature: [signature] Date: 11/19/21

Approved by: Name: Preston Bauder Signature: [signature] Date: 11/19/21

Meter box 6-month calibration form (orifices) R1

MONTROSE ENVIRONMENTAL

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice: Post-Test, English Meter Box Units, English K' Factor

Meter box ID:	MB 31
Meter ID (if applicable):	
Orifice set ID:	Shop #1
Calibrated by (initials):	JV
Current 6-month calibration Yd:	0.9902
Date of 6-month calibration:	11/19/21

Date:	1/28/22
Location:	PDX shop
No. of runs (default 3)	3
Barometric pressure (in. Hg):	30.36 in. Hg
Theoretical critical vacuum:	14.32 in. Hg

Current Cal. Yd:	**0.9902**
Post-test Yd:	**0.9773**
Post-test Result:	**PASS**

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.64	23.00	388.384	398.721	10.337		51		55	48	0.3434	21.0	62	62	62.3
0.64	15.00	398.721	405.447	6.726		55		58	48	0.3434	21.0	62	63	62.4
0.64	12.00	405.447	410.845	5.398		58		61	48	0.3434	21.0	63	63	62.8

--- SAMPLE RATE ---
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.64	0.46
0.64	0.46
0.64	0.46

--- DRY GAS METER ---
VOLUME CORRECTED

Vm(std) (cu ft)
10.808
6.985
5.573

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
10.492	10.232
6.842	6.673
5.471	5.341

-- DRY GAS METER --
CALIBRATION FACTOR
Yd

Value (number)	Variation (number)
0.9708	-0.007
0.9796	0.002
0.9817	0.004

--------- ORIFICE ---------
CALIBRATION FACTOR
ΔH@

Value (in H2O)	Variation (in H2O)
1.81	0.011
1.79	-0.001
1.79	-0.010

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	0.9773
Average ΔH@	1.7958
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	26	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Performed by: Name: Julian Vaca Signature: Julian Vaca Date: 1/28/22

Approved by: Name: Joe Heffernan Signature: Date: 1/28/22

Meter box post-test calibration form (orifices) R3

MONTROSE ENVIRONMENTAL

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice, Leak Check, and Thermocouple Calibration Check
English Meter Box Units, English K' Factor

Meter box ID:	MB 33
Meter ID (if applicable):	
Orifice set ID:	Shop #1
Calibrated by:	JV
Expires:	**6/4/22**

Date:	12/4/21
Location:	PDX shop
No. of orifices used (min. 3)	3
Barometric pressure (in. Hg):	30.13 in. Hg
Theoretical critical vacuum	14.21 in. Hg

Yd:	**1.0059**
ΔH@:	**1.6927**

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (In Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.61	12.00	332.783	338.107	5.324		60		61	48	0.3434	23.0	59	59	59.4
0.29	39.00	338.107	349.975	11.868		62		66	40	0.2356	24.5	59	60	59.7
1.10	21.00	349.975	362.562	12.587		66		69	55	0.4625	21.0	60	60	60.0

--- SAMPLE RATE ---
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.61	0.454
0.29	0.311
1.10	0.611

--- DRY GAS METER ---
VOLUME CORRECTED

Vm(std) (cu ft)
5.445
12.046
12.716

-------- ORIFICE --------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.448	5.324
12.145	11.875
12.832	12.554

-- DRY GAS METER --
CALIBRATION FACTOR
Yd

Value (number)	Variation (number)
1.0006	-0.005
1.0082	0.002
1.0091	0.003

-------- ORIFICE --------
CALIBRATION FACTOR
ΔH@

Value (in H2O)	Variation (in H2O)
1.701	0.008
1.707	0.014
1.670	-0.022

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	1.0059
Average ΔH@	1.6927
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	5	Should be 5-7 in. H_2O
Leak Rate, (in H_2O/min):	0	Must be zero (manometer level stable for 1 minute)

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	27	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Meter Box Thermocouple Readout Calibration Check

Input Temperature	Allowable Temp. Dev.*
25	7
75	8
125	9
250	11
300	11
350	12
400	13
500	14

Stack	Probe	Filter	Exit	Aux.	Meter In	Meter Out
28	30	26	27	28		26
79	74	76	78	76		76
129	128	127	127	125		126
254	246	252				
304	300	300				
350						
404						
503						

Thermocouple simulator	
Make/Model:	Altek Type K
Serial No.	541
Cal Date:	1/18/2021

Meter Thermocouple Calibration

Ref. Temp	Allowable Temp. Dev.*	Meter In	Meter Out
65	8		61
150	9		151

Reference Thermometer	
Make/Model:	Traceable
Serial No.	200456908
Cal Date:	4/2/2021

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Julian Vaca Signature: Julian Vaca Date: 1/28/22

Approved by: Name: Joe Heffernan Signature: Date: 1/28/22

Meter box 6-month calibration form (orifices) R1

MONTROSE ENVIRONMENTAL

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice: Post-Test, English Meter Box Units, English K' Factor

Meter box ID:	MB 33
Meter ID (if applicable):	
Orifice set ID:	Shop #1
Calibrated by (initials):	JV
Current 6-month calibration Yd:	1.0059
Date of 6-month calibration:	12/4/21

Date:	1/28/22
Location:	PDX shop
No. of runs (default 3)	3
Barometric pressure (in. Hg):	30.36 in. Hg
Theoretical critical vacuum:	14.32 in. Hg

Current Cal. Yd:	1.0059
Post-test Yd:	0.9965
Post-test Result:	PASS

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
1.10	22.00	34.180	47.116	12.936		53		57	55	0.4625	21.0	62	62	62.3
1.10	14.00	47.116	55.415	8.299		57		60	55	0.4625	21.0	62	63	62.4
1.10	10.00	55.415	61.453	6.038		60		62	55	0.4625	21.0	63	63	62.8

--- SAMPLE RATE ---
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
1.10	0.61
1.10	0.61
1.10	0.61

--- DRY GAS METER ---
VOLUME CORRECTED

Vm(std) (cu ft)
13.488
8.595
6.223

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
13.516	13.180
8.600	8.388
6.141	5.994

-- DRY GAS METER --
CALIBRATION FACTOR Yd

Value (number)	Variation (number)
1.0021	0.006
1.0006	0.004
0.9868	-0.010

--------- ORIFICE ---------
CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
1.71	0.010
1.69	-0.001
1.69	-0.008

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	0.9965
Average ΔH@	1.6956
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	27	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Performed by: Name: Julian Vaca Signature: Julian Vaca Date: 1/28/22

Approved by: Name: Joe Hefferna Signature: [signature] Date: 1/28/22

Meter box post-test calibration form (orifices) R3

Client	MONTROSE										6/8/21	Date
Set ID	TV1										in house	Job
DGM (Y) =	1.0043		Fluke ID	526		PLC	0 at		6 inH2O			Calibrated
DGM ID #	19461089		Std Manometer	537		NLC	0 at		22 inHg			QA/QC
Dry Gas Meter			Orifice ID #	35	Orifice ID #	44	Orifice ID #	51	Orifice ID #	56	Orifice ID #	65
K' Critical Orifice Coefficient				**0.18118**		**0.29561**		**0.38571**		**0.48188**		**0.64503**
	Symbol	Units	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2
Initial volume	V_i	ft²	950.255	959.124	964.043	974.337	919.608	932.158	979.755	989.768	995.407	1001.285
Final Volume	V_f	ft²	959.124	964.043	974.337	979.715	932.158	950.255	989.768	995.407	1001.285	1006.340
Difference	V_m	ft²	8.869	4.919	10.294	5.378	12.550	18.097	10.013	5.639	5.878	5.055
Temperatures												
Ambient	T_a	°F	78.2	80.9	81.8	81.9	77.7	81.5	82.3	82.2	82.7	82.2
Absolute ambient	T_a	°R	537.87	540.57	541.47	541.57	537.37	541.17	541.97	541.87	542.37	541.87
Initial Inlet	T_i	°F	68.3	73.2	73.1	77.5	76.3	80.9	76.4	83.5	83.5	89.3
Outlet	T_f	°F	68.3	71.1	72.1	73.1	74.5	74.1	73.3	74.4	74.5	75.5
Final Inlet	T_i	°F	73.2	73.3	77.5	76.8	80.9	81.5	83.5	83.5	89	88.1
Outlet	T_f	°F	71.1	72	73.1	73.1	74.1	74.6	74.4	74.5	75.5	75.5
Avg. Temp	T_m	°R	529.895	532.07	533.62	534.795	536.12	537.445	536.57	538.645	540.295	541.77
Time		min	38	21	27	14	25	36	16	9	7	6
		sec	0	0	0	0	0	0	0	0	0	0
			38.00	21.00	27.00	14.00	25.00	36.00	16.00	9.00	7.00	6.00
SAMPLE RATE		ACFM	0.2334	0.2342	0.3813	0.3841	0.5020	0.5027	0.6258	0.6266	0.8397	0.8425
Orifice man. rdg	dH@	in H_2O	0.17	0.17	0.48	0.48	0.85	0.85	1.40	1.40	2.50	2.50
Barometric. Pressure	Pbar	inHg	29.97	29.97	29.97	29.97	29.94	29.94	29.97	29.97	29.97	29.97
Pump vacuum		inHg	24.0	24.0	22.0	22.0	21.0	21.0	19.0	19.0	16.0	16.0
K' factor			0.1810	0.1814	0.2948	0.2964	0.3852	0.3862	0.4825	0.4812	0.6450	0.6451
K' factor Average				0.1812		0.2956		0.3857		0.4819		0.6450
% Error (+/- 0.5)		%	PASS	0.101%	PASS	0.270%	PASS	0.122%	PASS	0.138%	PASS	0.006%

Client	MONTROSE										1/7/22	Date
Set ID	Shop #1										in house	Job
DGM (Y) =	1.0043		Fluke ID	377		PLC	0 at		6 inH2O		MG	Calibrated
DGM ID #	19461089		Std Manometer	537		NLC	0 at		22 inHg		AG	QA/QC

Dry Gas Meter			Orifice ID #	40	Orifice ID #	48	Orifice ID #	55	Orifice ID #	63	Orifice ID #	73
K' Critical Orifice Coefficient				**0.23561**		**0.34338**		**0.46245**		**0.59087**		**0.80514**
	Symbol	Units	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2
Initial volume	V_i	ft²	917.940	924.040	930.150	939.080	949.300	955.305	963.695	973.715	983.760	991.155
Final Volume	V_f	ft²	924.040	930.150	939.080	945.345	955.305	963.695	973.715	983.760	991.155	996.425
Difference	V_m	ft²	6.100	6.110	8.930	6.265	6.005	8.390	10.020	10.045	7.395	5.270
Temperatures												
Ambient	T_a	°F	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5
Absolute ambient	T_a	°R	524.17	524.17	524.17	524.17	524.17	524.17	524.17	524.17	524.17	524.17
Initial Inlet	T_i	°F	65.8	68.3	69.1	73.8	67.5	71	74.1	79.5	80.5	85.2
Outlet	T_f	°F	63	64.1	64.6	65.3	64.2	64.2	64.5	65.7	66.8	68
Final Inlet	T_i	°F	68.8	69.6	73.8	74.2	71.8	74.8	80.7	82.5	87.5	88.5
Outlet	T_f	°F	64.1	64.6	65.3	65.7	64.2	64.5	65.7	66.8	68	68.7
Avg. Temp	T_m	°R	525.095	526.32	527.87	529.42	526.595	528.295	530.92	533.295	535.37	537.27
Time		min	20	20	20	14	10	14	13	13	7	5
		sec	0	0	0	0	0	0	0	0	0	0
			20.00	20.00	20.00	14.00	10.00	14.00	13.00	13.00	7.00	5.00
SAMPLE RATE		ACFM	0.3050	0.3055	0.4465	0.4475	0.6005	0.5993	0.7708	0.7727	1.0564	1.0540
Orifice man. rdg	dH@	in H_2O	0.27	0.27	0.60	0.60	1.10	1.10	1.90	1.90	3.70	3.70
Barometric. Pressure	Pbar	inHg	29.61	29.61	29.61	29.61	29.61	29.61	29.61	29.61	29.61	29.61
Pump vacuum		inHg	21.0	21.0	20.0	20.0	18.0	18.0	16.0	16.0	13.5	13.5
K' factor			0.2357	0.2355	0.3435	0.3433	0.4637	0.4612	0.5915	0.5903	0.8075	0.8028
K' factor Average				0.2356		0.3434		0.4625		0.5909		0.8051
% Error (+/- 0.5)		%	PASS	0.035%	PASS	0.035%	PASS	0.262%	PASS	0.099%	PASS	0.292%

Secondary Standard Calibration

DATE: 5/19/2021 Operator: Joe Camodeca

Meter Box No:		19461089		Meter Box H@:		0.0000			Meter Box Yd		1.0043				Barometric Pressure:		29.69
				Standard Meter Gas Volume			Meter Box Gas Volume (ft‹)			Std. Meter Temperature (ÞF)			Meter Box Temperature (ÞF)				
Q	P	H	Yds	Initial	Final	Vf	Initial	Final	Vf	Inlet	Outlet	Avg.	Inlet	Outlet	Avg.	Time	Yd	H@
1.24	-1.00	0.00	1.0000	0.0	5.000	5.000	848.000	853.046	5.046	71.0	71.0	71.0	73.0	73.0	73.0	3.98	0.9971	0.0000
1.24	-1.00	0.00	1.0000	0.0	5.000	5.000	853.046	858.103	5.057	71.0	71.0	71.0	73.0	73.0	73.0	3.98	0.9949	0.0000
1.24	-1.00	0.00	1.0000	0.0	5.000	5.000	858.103	863.151	5.048	71.0	71.0	71.0	73.0	73.0	73.0	3.98	0.9967	0.0000
0.97	-0.90	0.00	1.0000	0.0	5.000	5.000	828.701	833.727	5.026	71.0	71.0	71.0	73.0	73.0	73.0	5.08	1.0008	0.0000
0.98	-0.90	0.00	1.0000	0.0	5.000	5.000	833.727	838.746	5.019	71.0	71.0	71.0	73.0	73.0	73.0	5.05	1.0022	0.0000
0.97	-0.90	0.00	1.0000	0.0	5.000	5.000	838.746	843.760	5.014	71.0	71.0	71.0	73.0	73.0	73.0	5.08	1.0032	0.0000
0.75	-0.70	0.00	1.0000	0.0	5.000	5.000	813.102	818.098	4.996	71.0	71.0	71.0	73.0	73.0	73.0	6.55	1.0063	0.0000
0.76	-0.70	0.00	1.0000	0.0	5.000	5.000	818.098	823.100	5.002	71.0	71.0	71.0	73.0	73.0	73.0	6.53	1.0051	0.0000
0.76	-0.70	0.00	1.0000	0.0	5.000	5.000	823.100	828.089	4.989	71.0	71.0	71.0	73.0	73.0	73.0	6.52	1.0077	0.0000
0.61	-0.50	0.00	1.0000	0.0	5.000	5.000	794.500	799.481	4.981	71.0	71.0	71.0	73.0	73.0	73.0	8.15	1.0088	0.0000
0.61	-0.50	0.00	1.0000	0.0	5.000	5.000	799.481	804.457	4.976	71.0	71.0	71.0	73.0	73.0	73.0	8.15	1.0099	0.0000
0.61	-0.50	0.00	1.0000	0.0	5.000	5.000	804.457	809.441	4.984	71.0	71.0	71.0	73.0	73.0	73.0	8.05	1.0082	0.0000
0.39	-0.50	0.00	1.0000	0.0	5.000	5.000	771.200	776.184	4.984	71.0	71.0	71.0	73.0	73.0	73.0	12.63	1.0082	0.0000
0.39	-0.50	0.00	1.0000	0.0	5.000	5.000	776.184	781.168	4.984	71.0	71.0	71.0	73.0	73.0	73.0	12.63	1.0082	0.0000
0.39	-0.50	0.00	1.0000	0.0	5.000	5.000	781.168	786.157	4.989	71.0	71.0	71.0	73.0	73.0	73.0	12.65	1.0072	0.0000
																AVERAGE	1.0043	0.0000

Millennium Instruments Inc.
2402 Springridge Drive unit I
Spring Grove IL. 60081
PHONE#(815)675-3225
FAX#(815)675-6965
E-mail millennium@millinst.com
www.millinst.com

Calibrated By: Joe Camodeca

Signature:

Vacuum Gauge

(in. Hg)	Gauge
5.0	5.0
10.0	10.0
15.0	15.0
20.0	20.0
25.0	25.0

MONTROSE
ENVIRONMENTAL

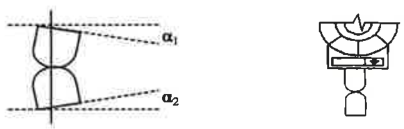
Pitot Tube Calibration Data Sheet

Calibration Date:	February 9, 2022	**Performed by:**	Julian Vaca	**Expiration Date:**	August 9, 2022
		ID No.:	2-7	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	2-7	**No damage:**	Yes
Probe Description:	Self Supporting Probe (SP)	**Effective Length (ft):**	2	**Level and Perpendicular:**	Yes
Thermocouple calibration performed?	Yes	**Thermocouple passed calibration?**	Yes		

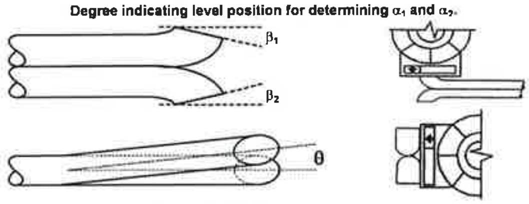
Protractor or Digital Angle Finder ID: 708
Measuring Tape ID: 720
Caliper ID: 705

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions



Degree indicating level position for determining α_1 and α_2.

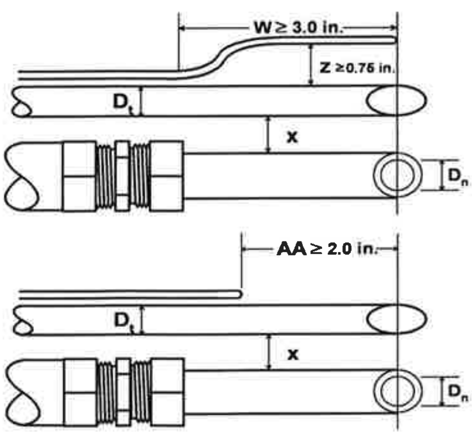


Degree indicating level position for determining θ.

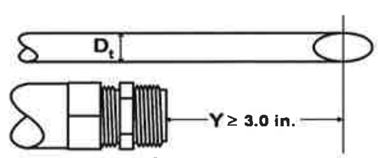
α_1 $(-10° < \alpha_1 < +10°)$	-2.7	
α_2 $(-10° < \alpha_2 < +10°)$	1.7	
β_1 $(-5° < \beta_1 < +5°)$	1.0	
β_2 $(-5° < \beta_2 < +5°)$	-1.7	
γ	0.7	
θ	1.4	
A	0.9675	
z= A tan γ (± 0.125")	0.0118	Pass
w= A tan θ (± 0.03125")	0.0236	Pass
D_t (0.1875" < D_t < 0.375")	0.3730	Pass
P_A ($1.05D_t$ < P_A < $1.5D_t$)	0.4505	Pass
P_B ($1.05D_t$ < P_B < $1.5D_t$)	0.4505	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	0.0000	Pass

Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")	13.500	Pass	Offset TC only
-or- AA (≥ 2.0")			Setback TC only
X	1.163		
D_n	0.211		
X / D_n (≥ 1.5)	5.509	Pass	
Y (≥ 3.0")	3.913	Pass	
Z ≥ 0.75"	1.055	Pass	Offset TC only



Performed By: Julian Vaca Signature: Julian Vaca Date: 2/9/22

Approved By: JH Signature: [signature] Date: 2/9/22

MONTROSE
ENVIRONMENTAL

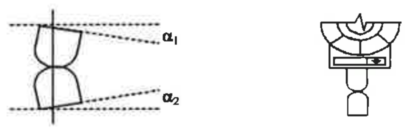
Pitot Tube Calibration Data Sheet

Calibration Date:	February 9, 2022	**Performed by:**	Julian Vaca	**Expiration Date:**	August 9, 2022
		ID No.:	002-TP-3	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	002-TP-3	**No damage:**	Yes
Probe Description:	TRAVERSE - Flow & Temp (TP)	**Effective Length (ft):**	2	**Level and Perpendicular:**	Yes
Thermocouple calibration performed?	Yes	**Thermocouple passed calibration?**			Yes

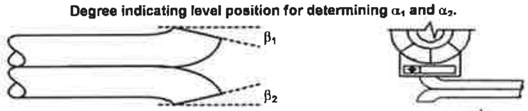
Protractor or Digital Angle Finder ID: 708
Measuring Tape ID: 720
Caliper ID: 705

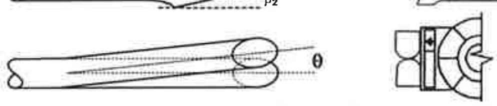
Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions



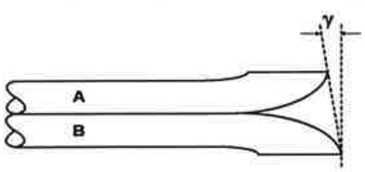
Degree indicating level position for determining α_1 and α_2.

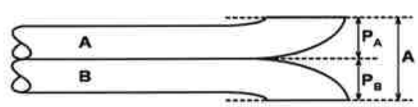




Degree indicating level position for determining θ.

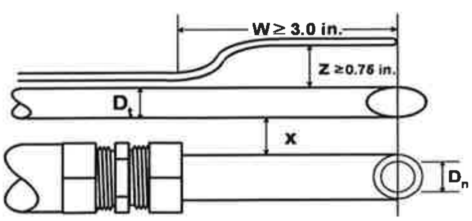
α_1 $(-10^\circ < \alpha_1 < +10^\circ)$	0.2	
α_2 $(-10^\circ < \alpha_2 < +10^\circ)$	0.6	
β_1 $(-5^\circ < \beta_1 < +5^\circ)$	0.2	
β_2 $(-5^\circ < \beta_2 < +5^\circ)$	2.0	
γ	1.1	
θ	0.4	
A	0.8275	
z= A tan γ (± 0.125")	0.0159	Pass
w= A tan θ (± 0.03125")	0.0058	Pass
D_t (0.1875" < D_t < 0.375")	0.3745	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.4890	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.4890	Pass
$\lvert P_A - P_B \rvert \le 0.0625$	0.0000	Pass



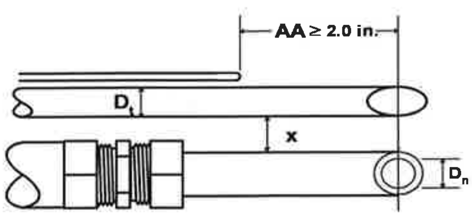


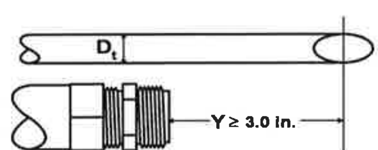
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")			Offset TC only
-or- AA (≥ 2.0")	2.079	Pass	Setback TC only
X			
D_n			
X / D_n (≥ 1.5)			
Y (≥ 3.0")			
Z ≥ 0.75"	N/A		Offset TC only





Performed By: Julian Vaca
Signature: Julian Vaca
Date: 2/9/22

Approved By: [signature]
Signature: [signature]
Date: 2/9/22

ACCREDITED
A2LA Certificate No. 1750.01
Calibration

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-11450724

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by : Traceable® Products 12554 Galveston Rd B230, Webster, TX 77598

ST2222-05

Instrument Identification:

Model: 4039,90205-22 S/N: 200456908 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Thermistor Module	A27129	04 Feb 2021	1000451212
Temperature Calibration Bath	B16388		
Temperature Probe	5267	21 Feb 2021	C0220028
Temperature Calibration Bath	B3A444		
Thermistor Module	B96382	19 Aug 2020	B9628006
Temperature Probe	5410	13 Sep 2020	B9801031

Certificate Information:

Technician: 420 Procedure: CAL-03 Cal Date: 02 Aug 2020 Cal Due Date: 02 Aug 2022

Test Conditions: 53.48%RH 23.62°C 1014mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	N.A.	N.A.		0.00	-0.6	Y	-1	1	0.058	>4:1
°C	N.A.	N.A.		100.00	100.1	Y	99	101	0.058	>4:1

This certificate indicates Traceability to standards provided by (NIST) National Institute of Standards and Technology and/or a National Standards Laboratory.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement : (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ± U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min=As Left Nominal(Rounded) – Tolerance; Max= As Left Nominal(Rounded) + Tolerance;

Nicol Rodriguez

Nicol Rodriguez, Quality Manager

Marisa Elms

Marisa Elms, Technical Manager

Note :

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°C change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

Issue Date : 02 Aug 2020

CONTROL COMPANY 12554 Galveston RD Suite B230 Webster TX USA 77598
Phone 281 482-1714 Fax 281 482-9448 sales@control3.com www.traceable.com

Control Company is an ISO/IEC 17025:2017 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2015 Quality Certified by DNV GL, Certificate No. CERT-01805-2006-AQ-HOU-ANAB.
International Laboratory Accreditation Cooperation - Multilateral Recognition Arrangement (ILAC-MRA).

Barometric Pressure Determination

Date: 01/26/22

Time: 1000

Data By: JH

Reference: http://forecast.weather.gov/MapClick.php?CityName=Orange&state

Reference Barometer ID	**Pearson Airfield (KVUO)**
Reference Barometer Location	**Lat:** 45.62103°N**Lon:** 122.65419°W**Elev:** 20ft.
Reference Barometer Other Info.	Last Update on 26 Jan 11:53 AM PST
Reference Barometer Indication, corrected to sea level	**30.29**
Reference Barometer Reference Elevation	**20**
Reference Barometer Actual Pressure	30.27
Test Barometer Location/Site	**EcoLube**
Location/Site Elevation	**16**
Location/Site Barometric Pressure	30.27
Sampling Location Height (above/below site elevation)	**20**
Sampling Location Barometric Pressure	**30.25**

Barometric Pressure Determination

Date: 01/27/22

Time: 0802

Data By: JH

Reference: http://forecast.weather.gov/MapClick.php?CityName=Orange&state

Reference Barometer ID	**Pearson Airfield (KVUO)**
Reference Barometer Location	**Lat:** 45.62103°N**Lon:** 122.65419°W**Elev:** 20ft.
Reference Barometer Other Info.	Last Update on 27 Jan 07:53 AM PST
Reference Barometer Indication, corrected to sea level	**30.41**
Reference Barometer Reference Elevation	**20**
Reference Barometer Actual Pressure	30.39
Test Barometer Location/Site	**EcoLube**
Location/Site Elevation	**16**
Location/Site Barometric Pressure	30.39
Sampling Location Height (above/below site elevation)	**20**
Sampling Location Barometric Pressure	**30.37**

Appendix D.3
Instrumental Test Method QA/QC Data

MONTROSE AIR QUALITY SERVICES

CEMS CONFIGURATION DATA

Project Information

Client / Facility: EColube Project No. Proj 011833

Source / Location: RTO #1 Method(s): 3A 25A

Test Dates: 1/26-1/27 Project Manager / Team (initials): SH JV PB

Analyzers In Service

Please circle all applicable	O_2	CO_2	CO	NO_x	SO_2			THC OUT ~~TRS~~	THC IN
Response Time (seconds)	30	30						75	30

Filtration (circle)

Filter Type In-Stack Out-of-Stack Sintered Other

Filter Material Glass Quartz Steel N/A Other

Sample Probe (circle)

Length 4'd 6' 8' 10' 12' 14' Other

Material Steel Glass Teflon Titanium Quartz Inconel Other

Heated Yes No

Probe Temperature 250 °F N/A

Conditioner / Moisture Knock-Out (circle)

In Use? Yes No

Coolant Ice and Water Anti-Freeze Electric Other

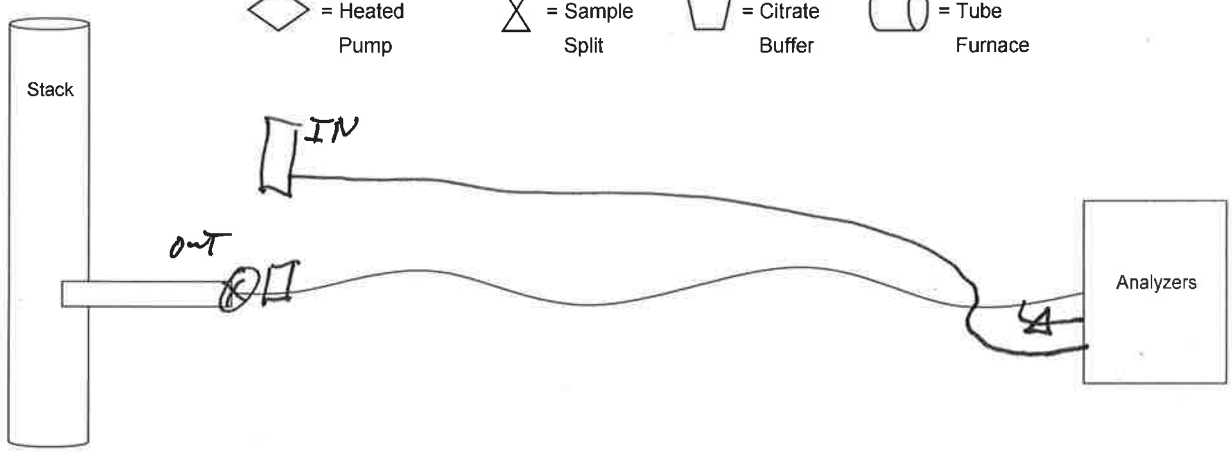
Trap Material Steel Glass Teflon Other

Leak Checks

Pre-Test	0.0 cfh LPM @ ___ in. Hg	0.0 cfh @ 20 in. Hg
Post-Test	0.0 cfh @ ___ in. Hg	0.0 cfh @ 20 in. Hg
System Flow Rate	5 cfh LPM	3 cfh LPM
Leak Rate	Post-Test (cfh) / System Flow Rate (cfh) * 100 = ___ %	___ %

Fill in locations of elements of the CEM system, as applicable

Legend
= Cal Tee
= Filter
= Gas Conditioner
= Heated Pump
= Sample Split
= Citrate Buffer
= Tube Furnace



Upstream of conditioner

Sample Line Length: 100 feet

Sample Line Material: TFE

Sample Line Temp.: 250 deg. F

Downstream of conditioner

Sample Line Length: 100 feet

Sample Line Material: TFE

Sample Line Temp.: 250 deg. F

If this information is not accurate for all runs, note exceptions here.

CEMS Config Data Sheet - R0

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Analyzer Configuration

Name:	O2-742	CO2-742	THC In 292	THC Out 297				
Make/Model:	SERVO 4900	Servo 4900	JUM 3-300A	JUM 3-300A				
25A or 7E:	7E	7E	25A	25A				
Voltage max:	10	10	10	10				
Voltage offset:	0	0	0	0				
Range:	10	10	10	10				
Upscale:								
Downscale:								

Cylinder Information

Zero Number:	EB0142052	EB0142052	EB0088889	EB0088889				
Zero Conc:	0	0	0	0				
Low Number:			EB0094136	EB0084949				
Low Conc:			304.3	29.57				
Mid Number:	CC66833	CC66833	CC308291	EB0081679				
Mid Conc:	10.05	9.857	495.6	49.63				
High Number:	CC734967	CC734967	CC342428	ALM019877				
High Conc:	23.04	22.49	853.3	84.75				
Bias Number:	CC734967	CC66833	CC308291	EB0081679				
Bias Conc:	23.04	9.857	495.6	49.63				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Calibration

	Name:	O2-742	CO2-742	THC In 292	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	JUM 3-300A	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				

Cylinder Concentrations

	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				

Calibration Readings

	Zero reading:	0.018	0.166	0.590	0.043				
	Low reading:	0.000	0.000	292.0	28.58				
	Mid reading:	10.11	10.20	491.2	48.27				
	High reading:	23.04	22.48	850.7	84.37				

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.078	0.738	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.525	N/A	N/A				
High %Err:	**<2.0**	0.000	-0.044	N/A	N/A				

EPA Method 25A Error Calculations

Zero Err:	**N/A**	N/A	N/A	0.590	0.043				
Low Err:	**5% of cyl**	N/A	N/A	-12.300	-0.990				
Mid Err:	**5% of cyl**	N/A	N/A	-4.400	-1.360				
High Err:	**N/A**	N/A	N/A	-2.600	-0.380				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Calibration

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				

Cylinder Concentrations

	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				

Calibration Readings

	Zero reading:	0.018	0.166	0.670	0.043				
	Low reading:	0.000	0.000	301.9	28.58				
	Mid reading:	10.11	10.20	494.7	48.27				
	High reading:	23.04	22.48	853.1	84.37				

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.078	0.738	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.525	N/A	N/A				
High %Err:	**<2.0**	0.000	-0.044	N/A	N/A				

EPA Method 25A Error Calculations

Zero Err:	**N/A**	N/A	N/A	0.670	0.043				
Low Err:	**5% of cyl**	N/A	N/A	-2.400	-0.990				
Mid Err:	**5% of cyl**	N/A	N/A	-0.900	-1.360				
High Err:	**N/A**	N/A	N/A	-0.200	-0.380				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Initial bias

	Name:	O2-742	CO2-742	THC In 292	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	JUM 3-300A	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				

Calibration Readings									
	Zero reading:	0.018	0.166	0.590	0.043				
	Low reading:	0.000	0.000	292.0	28.58				
	Mid reading:	10.11	10.20	491.2	48.27				
	High reading:	23.04	22.48	850.7	84.37				

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	0.078	0.738	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.525	N/A	N/A				
High %Err:	**<2.0**	0.000	-0.044	N/A	N/A				

EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	0.590	0.043				
Low %Err:	**5% of cyl**	N/A	N/A	-12.300	-0.990				
Mid %Err:	**5% of cyl**	N/A	N/A	-4.400	-1.360				
High %Err:	**N/A**	N/A	N/A	-2.600	-0.380				

Initial Bias Data									
	Zero reading:	0.335	0.137	N/A	N/A				
	Span reading:	22.99	10.09	N/A	N/A				
Zero % bias:	**<5.0**	1.376	-0.129	N/A	N/A				
Span % bias:	**<5.0**	-0.217	-0.489	N/A	N/A				

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Analyzer Configuration

Name:	O2-742	CO2-742	THC In 665	THC Out 297				
Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
25A or 7E:	7E	7E	25A	25A				
Voltage max:	10	10	10	10				
Voltage offset:	0	0	0	0				
Range:	10	10	10	10				
Upscale:								
Downscale:								

Cylinder Information

Zero Number:	EB0142052	EB0142052	EB0088889	EB0088889				
Zero Conc:	0	0	0	0				
Low Number:			EB0094136	EB0084949				
Low Conc:			304.3	29.57				
Mid Number:	CC66833	CC66833	CC308291	EB0081679				
Mid Conc:	10.05	9.857	495.6	49.63				
High Number:	CC734967	CC734967	CC342428	ALM019877				
High Conc:	23.04	22.49	853.3	84.75				
Bias Number:	CC734967	CC66833	CC308291	EB0081679				
Bias Conc:	23.04	9.857	495.6	49.63				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Calibration

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				

Cylinder Concentrations

	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				

Calibration Readings

	Zero reading:	0.013	0.097	0.340	0.270				
	Low reading:	0.000	0.000	297.7	29.79				
	Mid reading:	10.11	10.23	491.2	49.90				
	High reading:	23.10	22.55	852.3	84.66				

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.056	0.431	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.659	N/A	N/A				
High %Err:	**<2.0**	0.260	0.267	N/A	N/A				

EPA Method 25A Error Calculations

Zero Err:	**N/A**	N/A	N/A	0.340	0.270				
Low Err:	**5% of cyl**	N/A	N/A	-6.600	0.220				
Mid Err:	**5% of cyl**	N/A	N/A	-4.400	0.270				
High Err:	**N/A**	N/A	N/A	-1.000	-0.090				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Initial bias

	Name:	O2-742	CO2-742	THC In 665	THC Out 297				
	Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
	25A or 7E:	7E	7E	25A	25A				

Cylinder Concentrations

	Zero:	0.000	0.000	0.000	0.000				
	Low:			304.3	29.57				
	Mid:	10.05	9.857	495.6	49.63				
	High:	23.04	22.49	853.3	84.75				

Calibration Readings

	Zero reading:	0.013	0.097	0.340	0.270				
	Low reading:	0.000	0.000	297.7	29.79				
	Mid reading:	10.11	10.23	491.2	49.90				
	High reading:	23.10	22.55	852.3	84.66				

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.056	0.431	N/A	N/A				
Mid %Err:	**<2.0**	0.260	1.659	N/A	N/A				
High %Err:	**<2.0**	0.260	0.267	N/A	N/A				

EPA Method 25A Error Calculations

Zero %Err:	**N/A**	N/A	N/A	0.340	0.270				
Low %Err:	**5% of cyl**	N/A	N/A	-6.600	0.220				
Mid %Err:	**5% of cyl**	N/A	N/A	-4.400	0.270				
High %Err:	**N/A**	N/A	N/A	-1.000	-0.090				

Initial Bias Data

	Zero reading:	0.472	0.130	N/A	N/A				
	Span reading:	23.00	10.23	N/A	N/A				
Zero % bias:	**<5.0**	1.992	0.147	N/A	N/A				
Span % bias:	**<5.0**	-0.434	0.000	N/A	N/A				

MAQDAQ 1.0			
Project Name: Ecolube	Project Number: 006AS-011833	CEMS Operator: JH	Unit/Condition: RTO #1
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Analyzer Configuration

Name:	O2-742	CO2-742	THC In 665	THC Out 297				
Make/Model:	SERVO 4900	Servo 4900	VIG-20	JUM 3-300A				
25A or 7E:	7E	7E	25A	25A				
Voltage max:	10	10	10	10				
Voltage offset:	0	0	0	0				
Range:	10	10	10	10				
Upscale:								
Downscale:								

Cylinder Information

Zero Number:	EB0142052	EB0142052	EB0088889	EB0088889				
Zero Conc:	0	0	0	0				
Low Number:			EB0094136	EB0084949				
Low Conc:			304.3	29.57				
Mid Number:	CC66833	CC66833	CC308291	EB0081679				
Mid Conc:	10.05	9.857	495.6	49.63				
High Number:	CC734967	CC734967	CC342428	ALM019877				
High Conc:	23.04	22.49	853.3	84.75				
Bias Number:	CC734967	CC66833	CC308291	EB0081679				
Bias Conc:	23.04	9.857	495.6	49.63				

MONTROSE
AIR QUALITY SERVICES

INTERFERENCE RESPONSE TEST

Date of Test: 7/1/20 Name: Josh Muswieck
Analyzer: Type / Model: O2/CO2 Servomex 4900 HE# 742
Serial Number: 100321

Method Referenced: EPA Method 7E

O_2 Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response %	Interference % of Span (20.93 %)
SO_2	490.2	-0.03	0.14
H_2S	3.819	-0.04	0.19
NO	475.5	0.00	0.00
NO_2	50.93	0.04	0.19
H_2	40	0.14	0.67
CO	469.6	-0.09	0.43

A Calibration Cylinder containing 20.93% oxygen was used to Span Analyzer

Interference Response Results:

Sum of Absolute Differences	Sum of Individual Gases Percent Interferences	Max Allowable Percent of Span Interference (%)
0.34	1.62	2.5

CO_2 Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response %	Interference % of Span (18.55 %)
SO_2	490.2	-0.08	0.43
O_2	21.0	-0.09	0.49
NO	94.96	-0.09	0.49
NO_2	50.93	-0.09	0.49
H_2	40	0.00	0.00
CO	469.6	0.00	0.00

A Calibration Cylinder containing 18.55% carbon dioxide was used to Span Analyzer

Interference Response Results:

Sum of Absolute Differences	Sum of Individual Gases Percent Interferences	Max Allowable Percent of Span Interference (%)
0.35	1.9	2.5

INTERFERENCE RESPONSE TEST

Date of Test: 1/09/02 & 4/1/02 Name: Mike Eisele & Jay Griffith
Analyzer: Type / Model: VOC / J.U.M. 3-300A Serial Number: 000292

Test Gas	Concentration, ppmv or %	Analyzer Output Response, %	% of Span (100 ppmv)
SO_2	170.3 ppmv	0.0	0.0
O_2	20.95 %	0.0	0.0
*CO_2	9.7%	0.0	0.0
**CO	540 ppmv	1.0	1.0

*Used bottle of CO_2 at 100% concentration and diluted it with 100% N2 to get a concentration of about 10% CO_2.

**Used CO cylinder with 5% concentration and diluted it with 100% N_2 to get a concentration of about 500 ppmv CO.

Performance Specifications:

Analyzer	EPA Ref. Method	Allowable Interference (% of analyzer span)	Gas Values To Introduce Into Analyzers (EPA Method 20)
SO_2	6C	7%	200±20 ppm
O_2	6C	7%	20.9±1 percent
CO_2	6C	7%	10±1 percent
CO	20	2%	500±50 ppm

Note: Concentration for SO_2 was slightly lower than listed; 170.3 ppmv was the closest concentration cylinder available at the time of the interference checks.

MONTROSE AIR QUALITY SERVICES

INTERFERENCE RESPONSE TEST

Date of Test: 1/09/02 & 4/1/02 Name: Mike Eisele & Jay Griffith
Analyzer: Type / Model: VOC / J.U.M. 3-300A Serial Number: 000297

Test Gas	Concentration, ppmv or %	Analyzer Output Response, %	% of Span (100 ppmv)
SO_2	170.3 ppmv	0.0	0.0
O_2	20.95 %	0.0	0.0
*CO_2	9.7%	0.0	0.0
**CO	540 ppmv	1.0	1.0

*Used bottle of CO_2 at 100% concentration and diluted it with 100% N2 to get a concentration of about 10% CO_2.

**Used CO cylinder with 5% concentration and diluted it with 100% N_2 to get a concentration of about 500 ppmv CO.

Performance Specifications:

Analyzer	EPA Ref. Method	Allowable Interference (% of analyzer span)	Gas Values To Introduce Into Analyzers (EPA Method 20)
SO_2	6C	7%	200±20 ppm
O_2	6C	7%	20.9±1 percent
CO_2	6C	7%	10±1 percent
CO	20	2%	500±50 ppm

Note: Concentration for SO_2 was slightly lower than listed; 170.3 ppmv was the closest concentration cylinder available at the time of the interference checks.

MONTROSE
AIR QUALITY SERVICES

INTERFERENCE RESPONSE TEST

Date of Test: 11/28/17 Name: Brett Sherwood
Analyzer: Type / Model: VOC/VIG Model-20 HE# 665
Serial Number: 5760314

Method Referenced: EPA Method 7E

Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response ppmv	Interference % of Span (853.2 ppmv)
SO_2	490.2	-2	.23
O_2	9.012	-2	.23
CO_2	10.03	-2	.23
NO	475.5	-2	.23
NO2	50.08	-3	.35
CO	445.3	-3	.35

A Calibration Cylinder containing 853.2 ppmv propane was used to Span Analyzer

Interference Response Results:

Sum of Absolute Differences	Sum of Individual Gases Percent Interferences	Max Allowable Percent of Span Interference (%)
14	1.64	2.5

Airgas.
an Air Liquide company

Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI80E15A0138	Reference Number:	153-402185203-1
Cylinder Number:	CC66833	Cylinder Volume:	150.9 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72021	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 10, 2021

Expiration Date: Aug 10, 2029

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
CARBON DIOXIDE	10.00 %	9.857 %	G1	+/- 0.6% NIST Traceable	08/10/2021
OXYGEN	10.00 %	10.05 %	G1	+/- 0.4% NIST Traceable	08/10/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060405	CC411744	7.489 % CARBON DIOXIDE/NITROGEN	0.6%	May 14, 2025
NTRM	09060214	CC262390	9.961 % OXYGEN/NITROGEN	0.3%	Nov 05, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Jul 19, 2021
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Jul 12, 2021

Triad Data Available Upon Request

Approved for Release

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

Airgas
an Air Liquide company

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E03NI54E15A3808	Reference Number:	153-402267562-1
Cylinder Number:	CC734967	Cylinder Volume:	162.7 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72021	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Nov 01, 2021

Expiration Date: Nov 01, 2029

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
CARBON DIOXIDE	23.00 %	22.49 %	G1	+/- 0.7% NIST Traceable	11/01/2021
OXYGEN	23.00 %	23.04 %	G1	+/- 1.4% NIST Traceable	11/01/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060802	CC415397	24.04 % CARBON DIOXIDE/NITROGEN	0.6%	Dec 11, 2025
NTRM	12062008	CC367433	22.883 % OXYGEN/NITROGEN	0.2%	May 14, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Oct 28, 2021
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Oct 07, 2021

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E02AI99E15A0705	Reference Number:	153-400992491-1A
Cylinder Number:	EB0084949	Cylinder Volume:	146.2 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72017	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Sep 19, 2017

Expiration Date: Sep 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	30.00 PPM	29.57 PPM	G1	+/- 0.8% NIST Traceable	09/19/2017
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16061108	EB0081623	50.06 PPM PROPANE/AIR	0.5%	Jul 26, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 C3H8 LC3H8	FTIR	Sep 13, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E02AI99E15A0456	Reference Number:	153-400992493-1
Cylinder Number:	EB0081679	Cylinder Volume:	146.2 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72017	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Sep 05, 2017

Expiration Date: Sep 05, 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	50.00 PPM	49.63 PPM	G1	+/- 0.6% NIST Traceable	09/05/2017
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16061108	EB0081623	50.06 PPM PROPANE/AIR	0.5%	Jul 26, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 C3H8 LC3H8	FTIR	Aug 16, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E02AI99E15A0461	Reference Number:	153-401812144-1
Cylinder Number:	ALM019877	Cylinder Volume:	146.2 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72020	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	May 18, 2020

Expiration Date: May 18, 2028

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	84.75 PPM	G1	+/- 0.8% NIST Traceable	05/18/2020
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	17061011	ND61547	49.13 PPM PROPANE/AIR	0.4%	Jul 21, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 C3H8 LC3H8	FTIR	May 14, 2020

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E02AI99E15A00J9	Reference Number:	153-400972703-1
Cylinder Number:	EB0094136	Cylinder Volume:	146.2 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72017	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Aug 21, 2017

Expiration Date: Aug 21, 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	295.0 PPM	304.3 PPM	G1	+/- 1.0% NIST Traceable	08/21/2017
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	1	CC262296	249.1 PPM PROPANE/AIR	0.60	Jun 22, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 C3H8 MC3H8	FTIR	Aug 16, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E02AI99E15A0332	Reference Number:	153-401187525-1A
Cylinder Number:	CC308291	Cylinder Volume:	146.3 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	May 14, 2018

Expiration Date: May 14, 2026

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	500.0 PPM	495.6 PPM	G1	+/- 0.8% NIST Traceable	05/14/2018
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	01010307	K010660	499.3 PPM PROPANE/AIR	0.6%	Jul 24, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 C3H8 MC3H8	FTIR	Apr 17, 2018

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas Specialty Gases
Airgas USA LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E02AI99E15A0333	Reference Number:	48-124492620-1
Cylinder Number:	CC342428	Cylinder Volume:	146.3 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32015	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	May 12, 2015

Expiration Date: May 12, 2023

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	850.0 PPM	853.3 PPM	G1	+/- 0.9% NIST Traceable	05/12/2015
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 AUP2010243 C3H8	FTIR	Apr 24, 2015

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	153-402093072-1
Cylinder Number:	EB0142052	Cylinder Volume:	142.0 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2000 PSIG
Analysis Date:	Apr 19, 2021	Valve Outlet:	580
Lot Number:	153-402093072-1		

Expiration Date: Apr 19, 2029

ANALYTICAL RESULTS

Component	Requested Purity		Certified Concentration
NITROGEN	99.9995 %		99.9995 %
CARBON DIOXIDE	1.0 PPM	<LDL	0.03 PPM
NOx	0.1 PPM	<LDL	0.02 PPM
SO2	0.1 PPM	<LDL	0.1 PPM
THC	0.1 PPM	<LDL	0.04 PPM
CARBON MONOXIDE	0.5 PPM	<LDL	0.03 PPM

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

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

Signature on file

Approved for Release

Airgas Specialty Gases
Airgas USA LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	AI CZ15A	Reference Number:	153-401375459-1
Cylinder Analyzed:	CC334206	Cylinder Volume:	146.0 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2000 PSIG
Analysis Date:	Dec 14, 2018	Valve Outlet:	590
Lot Number:	153-401375459-1		

Expiration Date: Dec 14, 2026

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
AIR		
Carbon Dioxide	1.0 PPM	0.01 PPM
NOx	0.1 PPM	0.01 PPM
Sulfur Dioxide	0.1 PPM	0.01 PPM
THC	0.1 PPM	0.01 PPM
Percent Oxygen	20-21 %	20.57 %
Carbon Monoxide	0.5 PPM	0.01 PPM

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

Cylinders in Batch:

ALM019227, CC334206, CC33533, EB0088889

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

Signature on file

Approved for Release

Appendix D.4
Accreditation Information/Certifications

American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

MONTROSE AIR QUALITY SERVICES

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 4th day of February 2022.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3925.01
Valid to February 29, 2024

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

CERTIFICATE OF COMPLETION

Joseph M Heffernan III

This document certifies that this individual has passed a comprehensive examination and is now a Qualified Individual (QI) as defined in Section 8.3 of ASTM D7036-04 for the following method(s):

Source Evaluation Society Group 1: *EPA Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*

Certificate Number: 06-2021-5

Tate Strickler, VP – Quality Systems

DATE OF ISSUE: 1/15/21

DATE OF EXPIRATION: 1/14/26

MONTROSE ENVIRONMENTAL

CERTIFICATE OF COMPLETION

Joe Heffernan III

This document certifies that this individual has passed a comprehensive examination and is now a Qualified Individual (QI) as defined in Section 8.3 of ASTM D7036-04 for the following method(s):

Source Evaluation Society Group 3: *EPA Gaseous Pollutants Instrumental Sampling Methods*

Certificate Number: 006-2019-4

Tate Strickler, Accreditation Director

DATE OF ISSUE: 4/11/19

DATE OF EXPIRATION: 4/11/24

MONTROSE ENVIRONMENTAL

CERTIFICATE OF COMPLETION

Joseph M Heffernan III

This document certifies that this individual has passed a comprehensive examination and is now a Qualified Individual (QI) as defined in Section 8.3 of ASTM D7036-04 for the following method(s):

EPA Method 23

Certificate Number: 006-2021-8

Tate Strickler, VP – Quality Systems

DATE OF ISSUE: 1/26/21

DATE OF EXPIRATION: 1/26/26

MONTROSE ENVIRONMENTAL

Certificate of Training

Julian Vaca

has successfully completed the course

EPA Reference Method 9 and 22

presented by

Smoke School, Inc.

09/01/2021

Date

Garrett Bosch

Instructor

Appendix D.5
Quality Assurance Program Summary and Equipment Calibration Schedule

QUALITY ASSURANCE PROGRAM SUMMARY AND CERTIFICATIONS

Montrose Air Quality Services, LLC (Montrose) ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by internal QA personnel and encompasses seven major areas:

1. Development and use of an internal QA manual
2. QA reviews of reports, laboratory work, and field testing
3. Equipment calibration and maintenance
4. Chain of custody
5. Continuous training
6. Knowledge of current test methods
7. Audit program

Each of these areas is discussed individually below.

Quality Assurance Manual. Montrose has prepared a QA Manual according to EPA guidelines and ASTM D-7036. The manual serves to document and formalize all of Montrose's QA efforts. The manual is constantly updated, and each employee involved in technical services for emission measurements is required to read, understand its contents, and sign a statement that all work they perform will conform to its practices. The manual includes details on the other seven QA areas discussed below.

QA Reviews. Montrose 's review procedure includes review of each source test report by the QA Manager or equivalent position including data input, calculations and averages, and report text. The laboratory manager or equivalent reviews all laboratory work, and the qualified individual on-site reviews all field work and data sheets.

The most important review is the one that takes place before a test program begins. The QA Manager works with testing personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined below. The schedules for maintenance and calibrations are given in Tables A-1 and A-2.

Quality control checks are also conducted in the field for each test program. A partial list of checks made as part of each continuous analyzer system test series is included below as an example of the field QA procedures.

- Sample acquisition and conditioning system leak check
- 3-point analyzer calibrations (all analyzers)
- Complete system calibration check ("dynamic calibration" through entire sample system)

- Periodic analyzer calibration checks are conducted at the start and end of each test run. Any change between pre- and post-test readings are recorded.
- All calibrations are conducted using EPA Protocol gases certified by the manufacturer
- Calibration and continuous analyzer performance data are fully documented, and are included in each source test report

Chain of Custody. Montrose maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Montrose documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only laboratory personnel have access. Neither other Montrose employees nor cleaning crews have keys to this area.

Training. Personnel training is essential to ensure quality testing. Montrose has formal and informal training programs which may include some or all of the following:

1. Attendance at EPA-sponsored training courses
2. A requirement for all technicians to read, understand, and sign Montrose 's QA Manual
3. In-house training and Montrose meetings on a regular basis
4. Maintenance of training records
5. Administration of internal qualified individual (QI) tests for all methods performed
6. Participation in the Qualified Source Testing Individual (QSTI) program administered by the Source Evaluation Society (SES)

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. Montrose subscribes to services which provide updates on EPA reference methods, and on EPA and local agency rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences.

Audit Program. Montrose participates in the TNI Stationary Source Audit Sample (SSAS) audit program for all methods for which audit samples are available.

TABLE A-1
SAMPLING INSTRUMENTS AND
EQUIPMENT CALIBRATION SCHEDULE

Instrument Type	Frequency of Calibration[1]	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter(large)	12 months	Calibrated dry test meter	± 2% of volume measured
Dry Gas Meter	6 months or when repaired	Calibrated dry test meter	± 2% of volume measured
Critical Orifice	6 months	Calibrated dry test meter	± 0.5% of average K’
S-Type Pitot (for use with EPA-type sampling train)	6 months	EPA Method 2	Geometric measurements within method-specified ranges
Vacuum Gauges	12 months	NIST-traceable gauge	≤ 1.0 in Hg difference
Temperature Measurement (thermocouples)	12 months	NBS mercury thermometer or NBS calibrated platinum RTD	±4 °F for <400 °F ± 1.5% for >400 °F
Temperature Readout Devices	6 months	Thermocouple simulator	± 2% full scale reading
Analytical Balance	12 months (check prior to each use)	NIST-traceable weights	± 0.5 mg of stated weight
Probe Nozzles	12 months	Nozzle diameter check	Range <± 0.10 mm for micrometer three measurements
Continuous Analyzers	Every field day, Depends upon use, frequency and performance	As specified by manufacturers’ operating manuals, EPA NBS gases and/or reference methods	Satisfy all limits specified in operating specifications

[1] The tabulated calibration frequencies are minimum standards. In certain instances, calibrations are performed more frequently.

TABLE A-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and Montrose's Experience

Equipment	Performance Requirement	Maintenance Interval[2]	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw manufacturer required vacuum and flow	6 months	1. Visual inspection 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	6 months	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by the manufacturer	As recommended by manufacturer
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Leak check 3. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

[2] The tabulated maintenance intervals are minimum standards. In certain instances, maintenance is performed more frequently.

APPENDIX E
REGULATORY INFORMATION

Appendix E.1
Regulatory Correspondence

Oregon
Kate Brown, Governor

Department of Environmental Quality
Agency Headquarters
700 NE Multnomah Street, Suite 600
Portland, OR 97232
(503) 229-5696
FAX (503) 229-6124
TTY 711

November 10, 2021

Ricci Keller
EcoLube Recovery
11535 N Force Ave.
Portland, OR 97217

Ms. Keller,

DEQ has reviewed the source test plan submitted by EcoLube Recovery on November 8, 2021 for source testing to complete a Cleaner Air Oregon Toxic Air Contaminant Emission Inventory (Inventory). Based on our review, DEQ requires that the following issues be addressed in a revised source test plan. A revised source test plan is due at least **15 days** prior to the planned testing, which is currently scheduled to start December 15, 2021.

Specific Comment

1. Please revise the source test plan to include estimated In-Stack Detection Limits (ISDLs) for all TACs. The Table below is an example.

PAH	MDL (ng)	LOQ (ng)	Observed MDL (ng)	Estimated ISDL (ng/dscm) based on Observed MDL and 120 ft3 minimum sample volume	Estimated conc. based on EF (ng/dscm)
Naphthalene	0.5	1	2620	?	7111.9
2-Methylnaphthalene	0.5	1	12.3	?	301.4
Acenaphthene (CCC)	0.5	1	494	?	11.6
Acenaphthylene	0.5	1	443	?	30.2

2. Please revise the list of PCB analytes to identify each PCB by the congener number as listed in OAR 340-245-8020 Table 2.

DEQ acknowledges the challenges in establishing an accurate Inventory for this facility, and the results of this source test will provide valuable information for completing the risk assessment.

Please contact me directly at 503.879.0054, thomas.rhodes@deq.state.or.us, and we look forward to your continued assistance with this process.

Sincerely,

Thomas Rhodes

Thomas Rhodes
DEQ CAO Source Test Coordinator

26-3021 EcoLube Recovery, LLC

Oregon

Kate Brown, Governor

Department of Environmental Quality
Agency Headquarters
700 NE Multnomah Street, Suite 600
Portland, OR 97232
(503) 229-5696
FAX (503) 229-6124
TTY 711

Cc: Eric Spencer, EcoLube Recovery
Drew Lane, EcoLube Recover
John Browning, Bridgewater Group
Joshua Alexander, DEQ
Matt Hoffman, DEQ
Kenzie Billings, DEQ
J.R. Giska, DEQ
Keith Johnson, DEQ

SOURCE TEST PLAN
2021 COMPLIANCE TESTING
ECOLUBE RECOVERY
PORTLAND FACILITY
REGENERATIVE THERMAL OXIDIZER #1
PORTLAND, OREGON

Prepared For:

Ecolube Recovery
11535 N Force Ave
Portland, OR 97217

For Submittal To:

Oregon Dept. of Environmental Quality (ODEQ)
700 NE Multnomah St. Suite 600
Portland, OR 97232

Prepared By:

Montrose Air Quality Services, LLC
13585 NE Whitaker Way
Portland, OR 97230

Document Number:	**W006AS-011833-PP-900R1**
Proposed Test Dates:	**December 15-16, 2021**
Submittal Date:	**November 8, 2021**

TABLE OF CONTENTS

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MONTROSE AIR QUALITY SERVICES

LIST OF APPENDICES

LIST OF TABLES

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Montrose Air Quality Services, LLC (Montrose) has been contracted by Ecolube Recovery (Ecolube) to perform a series of air emission tests at their Portland, Oregon facility. The tests will be conducted to determine compliance with VOC destruction efficiency and emission factor verification requirements of the Oregon Department of Environmental Quality (ODEQ) Permit # 26-3021-ST-01, plus outlet RTO testing in order to provide a complete and approvable inventory for the purposes of the Cleaner Air Oregon program.

The specific objectives are to:

- Measure emissions of VOCs, O_2 and CO_2 at the inlet / outlet of the RTO #1
- Measure emissions of each dioxin and furan congener listed in OAR 340-245-8020 Table 2, as well as totals for each class of congeners
- Measure emissions of each PCB congener listed in OAR 340-245-8020 Table 2
- Measure emissions of each PAH and PAN-derivative listed in OAR 340-245-8020 Table 2
- Measure emissions of chlorobenzene and chlorophenol
- Conduct the test program with a focus on safety

Montrose will provide the test personnel and the necessary equipment to measure emissions as outlined in this test plan. Facility personnel will provide the process and production data to be included in the final report. A summary of the test program and proposed schedule is presented in Table 1-1.

TABLE 1-1
SUMMARY OF TEST PROGRAM AND PROPOSED SCHEDULE

Proposed Test Date(s)	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
12/15/21	RTO #1 Inlet	Velocity/Volumetric Flow Rate	EPA 1,2	2	10
"	"	O_2, CO_2	EPA 3/3A	2	60
"	"	Moisture	EPA 4	2	60
"	"	VOC	EPA 25A	2	60
12/15/21	RTO #1 Outlet	Velocity/Volumetric Flow Rate	EPA 1,2	2	240
"	"	O_2, CO_2	EPA 3/3A	2	240
"	"	Moisture	EPA 4	2	240
"	"	Opacity	EPA 9	2	6
"	"	PCDD, PCDF, PCB, PAH	EPA 23	2	240
"	"	VOC	EPA 25A	2	60
12/16/21	RTO #1 Inlet	Velocity/Volumetric Flow Rate	EPA 1,2	2	10
"	"	O_2, CO_2	EPA 3/3A	2	60
"	"	Moisture	EPA 4	2	60
"	"	VOC	EPA 25A	2	60
12/16/21	RTO #1 Outlet	Velocity/Volumetric Flow Rate	EPA 1,2	2	240
"	"	O_2, CO_2	EPA 3/3A	2	240
"	"	Moisture	EPA 4	2	240
"	"	Opacity	EPA 9	2	6
"	"	PCDD, PCDF, PCB, PAH	EPA 23	2	240
"	"	VOC	EPA 25A	2	60
--	--	Post-test thermocouple calibration check	EPA ALT-011	--	--

To simplify this test plan, a list of Units and Abbreviations is included in Appendix A. Throughout this test plan, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

1.2 APPLICABLE REGULATIONS AND EMISSION LIMITS

The results from this test program are presented in units consistent with those listed in the applicable regulations or requirements. The reporting units and emission limits are presented in Table 1-2.

TABLE 1-2
REPORTING UNITS AND EMISSION LIMITS

Unit ID/ Source Name	Parameter	Reporting Units	Emission Limit	Emission Limit Reference
RTO #1 Outlet	Visible Emissions	% opacity	20%	Permit 1.1
"	VOC	DE	97%[1]	Permit 4.1
"	PCDD	lb/hr	NA	NA
"	PCDF	lb/hr	NA	NA
"	PCB	lb/hr	NA	NA
"	PAH	lb/hr	NA	NA

[1]VOC destruction efficiency must be 97% or better or 3 ppm VOC as propane outlet concentration if the inlet VOC as propane concentration is 100 ppm or less to show compliance

1.3 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location:	Ecolube Recovery Portland Facility 11535 N Force Ave Portland, OR 97217	
Project Contact:	Eric Spencer	
Role:	Chief Executive Officer	
Company:	Ecolube Recovery	
Telephone:	503-209-5249	
Email:	espencer@ecoluberecovery.com	

Agency Information

Regulatory Agency:	Oregon Department of Environmental Quality (ODEQ)	
Agency Contact:	Thomas Rhodes	Joshua Muswieck
Telephone:	503-229-5534	971-349-0956
Email:	Rhodes.Thomas@deq.state.or.us	Joshua.Muswieck@deq.state.or.us

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC (Montrose)
Contact:	Joe Heffernan III
Title:	Client Project Manager
Telephone:	503-702-8683
Email:	jheffernan@montrose-env.com

Laboratory Information

Laboratory:	Enthalpy Analytical
City, State:	Wilmington, NC

Subcontractor (or Consultant) Information

Company:	Bridgewater Group
Contact:	John Browning
Telephone:	503-412-9842
Email:	jbrowning@bridgeh2o.com

Table 1-3 details the roles and responsibilities of the test team.

TABLE 1-3
TEST PERSONNEL AND RESPONSIBILITIES

Role	Primary Assignment	Additional Responsibilities
Client Project Manager	Coordinate Project Operate mobile lab	Post-test follow-up Facility interface, test crew coordination
Field Technicians	Execute stack platform responsibilities	Preparation, support PM

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

The EcoLube used oil facility consists of two distinct processes: PESCO Refinery and Base Oil. The Base Oil process itself has two separate components, Sulfonation and Oil Polishing. All three of these processes generate air emissions. These three emission streams are combined and routed into a single, 2-can natural gas-fired Regenerative Thermal Oxidizer (RTO) built by EPCON Systems. The Regenerative Thermal Oxidizer is capable of achieving > 97% destruction of VOCs or 3ppm VOC as propane outlet concentration if the inlet VOC as propane concentration is 100 ppm or less. The result is a single-point emission source for the EcoLube facility.

The PESCO refinery takes deliveries of lubricating oils and processes them to create VGO (Vacuum Gas Oil) as the main product. Secondary products are a Light End Distillate fuel, which is combusted on site in Oil Heater #3 to heat the refinery, and heavy oil flux, which is sold into the asphalt industry. The effluent from the PESCO refinery is routed through Oil Heater #3. The combustion exhaust gases from Oil Heater #3 are routed to the RTO for treatment.

VGO from the PESCO Refinery can then be run through part or all of the Base Oil process.

Sulfonation involves the reaction of the VGO from the refinery with sulfur trioxide (SO_3). Sulfur trioxide generated onsite (diluted in air to <2%v) is sent to an Annular Falling Film Reactor (AFFR), where it contacts and reacts with the VGO for the purpose of removing contaminants, color bearing agents and aromatic compounds in the form of sulfonic acid. The sulfonated material is a tarry, black liquid suspended in the oil and must be removed for the oil to become Group II. This is achieved in the Oil Polishing System.

The air effluent from the sulfonation plant (which will contain SO_2, SO_3, and variable but minuscule amounts of mercaptans) is sent through a preliminary treatment process. It first is routed through a packed column continuously flushed with dilute caustic soda (NaOH) which absorbs the SO_2. It is then sent through a constantly irrigated Brownian motion filter, where the SO_3 and any entrained oil is removed. Finally, the effluent containing relatively small amounts of VOCs is routed to the RTO for final treatment.

The Oil Polishing System has two distinct steps: (1) Sulfonic Separation, (2) Clay Filtration. The sulfonated material will be separated from the oil through two centrifuges installed in series. This material will be sent to the existing asphalt flux tank, where it can be combined and sold as a product. The Sulfonic Separation process is not a source of air emissions exhausted to the RTO.

The oil product from Sulfonic Separation is sent to the PESCO Beam Lube Polishing System (LPS). This system utilizes Bauxite filled columns which "polish" the oil, removing color bearing compounds. On a continuous basis various Bauxite columns are reactivated through thermal desorption.

The effluent from the thermal desorption process passes through a condensing heat exchanger. The majority of the desorbed material is recovered and recycled to the refinery feed tank and the remaining effluent is then sent to the RTO for treatment.

2.2 FLUE GAS SAMPLING LOCATIONS

Actual stack measurements, number of traverse points, and location of traverse points will be evaluated in the field as part of the test program. Table 2-1 presents the anticipated stack measurements and traverse points for the sampling locations listed.

TABLE 2-1
SAMPLING LOCATIONS

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance Downstream EPA "B" (in./dia.)	Distance from Nearest Disturbance Upstream EPA "A" (in./dia.)	Number of Traverse Points
RTO #1 Inlet	17.25	~53/~3.1	~29/1.7	Flow: 16 (8/port); Gaseous: 1
RTO #1 Outlet	19.5	~146/~7.5	~33/~1.7	Isokinetic: 16 (8/port); Gaseous: 3

Sample locations are verified in the field to conform to EPA Method 1. Acceptable cyclonic flow conditions are confirmed prior to testing using EPA Method 1, Section 11.4. Appendix A presents stack schematics and process flow diagrams.

2.3 OPERATING CONDITIONS AND PROCESS DATA

Ecolube is targeting the following process flow rates:

- PESCO Refinery = 14.5 GPM into Flash Tank
  - This is the nameplate capacity of the unit
- Sulfonation = 8 GPM
  - This is 70% of the nameplate capacity of the unit
  - This is 100% of the design capacity of the unit based on the output capacity of the PESCO refinery.
- OPS = 8 GPM
  - This is 70% of the nameplate capacity of the unit
  - This is 100% of the design capacity of the unit based on the output capacity of the PESCO refinery.

In no case will sampling replicates be separated by twenty-four (24) or more hours, unless prior authorization is granted by the Department.

Plant personnel will establish the test conditions and will collect all applicable unit-operating data. Montrose will monitor the collection of process data and will provide additional data collection as necessary to document operation. Data collected will include the following parameters:

- Natural gas usage, scfh

- Operating temperature of the oxidizer
- Other normally recorded process information for the oxidizer system
- Quantity of oil processed thru PESCO refinery
- Flash point of the fuel for Oil Heater No. 3
- Type and quantity of fuel burned at Oil Heater No. 3
- Content of halogens, and PCB in the fuel for Oil Heater No. 3
- Quantity of oil process through the sulfonation system
- Quantity of oil processed through the oil polishing system

Process	Parameter	Device
Refinery	Flash Tank Feed Rate	Instrument (Trended in Control System)
	WFE-1 Feed Rate	Instrument (Trended in Control System)
	WFE-1 Vacuum	Instrument (Trended in Control System)
Sulfonation	Sulfur Flow Rate	Instrument (Trended in Control System)
	Oil Flow Rate	Instrument (Trended in Control System)
	Air Flow Rate	Instrument (Trended in Control System)
OPS	Train 1 Feed Rate	Instrument (Trended in Control System)
	Train 2 Feed Rate	Instrument (Trended in Control System)
	Reactivation Vacuum	Instrument (Trended in Control System)
RTO	Inlet Pressure	Instrument (Trended in Control System)
	Average Chamber Temp	Instrument (Trended in Control System)
	Exhaust Temperature	Instrument (Trended in Control System)

The EcoLube facility only processes lubrication type oils (e.g. motor oil, crank-case oil, etc.). The PESCO Refinery will be fed out of Tank-12, which will be filled with this type of oil.

The following products/byproducts will be generated during the test:

- PESCO Refinery
    - Vacuum Gas Oil (VGO)
    - Light End Distillate
    - Process Water
    - Heavy Oil Flux

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- Sulfonation
    - Sulfonated VGO
    - 98% H_2SO_4
    - Process Water
- OPS
    - GII Base Oil
    - Sulfonated VGO Substrate

The PESCO refinery and SULFO-1/OPS-1 is a continuous process with intermediate tankage which can be used for hold-up volume in the event of a downstream process disruption.

- The PESCO Refinery generates VGO which is stored in tank IT100-1.
- SULFO-1 is fed from IT100-1 and directly feeds the separation part of the OPS process (centrifuges).
- The oil coming out of the centrifuges is sent to the LPS feed tanks (TK10301/TK10302).
- The LPS sends the GII base oil to the product storage tanks (TK10401/TK10402/TK10403/TK10404).'

As stated previously, Oil Heater #4 was decommissioned in February 2017 and completely demolished and removed from the site in 2018.

Process flow rates are discussed above.

The proposed test conditions represent the maximum normal operating conditions of the EcoLube facility. These would be the "worst-case" conditions since our operation does not deviate from these conditions unless to run at a slower rate due to supply issues.

2.4 PLANT SAFETY

Montrose will comply with all safety requirements at the facility. The facility Client Sponsor, or designated point of contact, is responsible for ensuring routine compliance with plant entry, health, and safety requirements. The Client Sponsor has the authority to impose or waive facility restrictions. The Montrose test team leader has the authority to negotiate any deviations from the facility restrictions with the Client Sponsor. Any deviations must be documented.

2.4.1 Safety Responsibilities

Planning

- Montrose must complete a field review with the Client Sponsor prior to the project date. The purpose of the review is to develop a scope of work that identifies the conditions, equipment, methods, and physical locations that will be utilized along with any policies or procedures that will affect our work.
- We must reach an agreement on the proper use of client emergency services and ensure that proper response personnel are available, as needed.

- The potential for chemical exposure and actions to be taken in case of exposure must be communicated to Montrose. This information must include expected concentrations of the chemicals and the equipment used to identify the substances.
- Montrose will provide a list of equipment being brought to the site, if required by the client.

Project Day

- Montrose personnel will arrive with the appropriate training and credentials for the activities they will be performing and the equipment that they will operate.
- Our team will meet daily to review the Project Scope, Job Hazard Assessment, and Work Permits. The Client Sponsor and Operations Team are invited to participate.
- Montrose will provide equipment that can interface with the client utilities previously identified in the planning phase and only work with equipment that our client has made ready and prepared for connection.
- We will follow client direction regarding driving safety, safe work permitting, staging of equipment, and other crafts or work in the area.
- As per 40 CFR Part 60 Subpart A, Section 60.8, the facility must provide the following provisions at each sample location:
  - Sampling ports, which meet EPA minimum requirements for testing. The caps should be removed or be hand-tight.
  - Safe sampling platforms.
  - Safe access to the platforms and test ports, including any scaffolding or man lifts.
  - Sufficient utilities to perform all necessary testing.
- Montrose will use the client communication system, as directed, in case of plant or project emergency.
- Any adverse conditions, unplanned shutdowns or other deviations to the agreed scope and project plan must be reviewed with the Client Sponsor prior to continuing work. This will include any safe work permit and hazard assessment updates.

Completion

- Montrose personnel will report any process concerns, incidents or near misses to the Client Sponsor prior to leaving the site.
- Montrose will clean up our work area to the same condition as it was prior to our arrival.
- We will ensure that all utilities, connection points or equipment have been returned to the pre-project condition or as stated in the safe work permit. In addition, we will walk out the job completion with Operations and the Client Sponsor if required by the facility.

2.4.2 Safety Program and Requirements

Montrose has a comprehensive health and safety program that satisfies State and Federal OSHA requirements. The program includes an Illness and Injury Prevention Program, site-specific safety meetings, and training in safety awareness and procedures. The basic elements include:

- All regulatory required policies/procedures and training for OSHA, EPA and FMCSA
- Medical monitoring, as necessary
- Use of Personal Protective Equipment (PPE) and chemical detection equipment
- Hazard communication
- Pre-test and daily toolbox meetings
- Continued evaluation of work and potential hazards.
- Near-miss and incident reporting procedures as required by Montrose and the Client

Montrose will provide standard PPE to employees. The PPE will include but is not limited to; hard hats, safety shoes, glasses with side shields or goggles, hearing protection, hand protections, and fall protection.

The detailed Site Safety Plan for this project is attached to this test plan in Appendix “S”.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 TEST METHODS

The test methods for this test program were presented previously in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Stausscheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1. The molecular weight of the gas stream is determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate is calculated using the measured average velocity head, the area of the duct at the measurement plane, the measured average temperature, the measured duct static pressure, the molecular weight of the gas stream, and the measured moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - S-type pitot tube coefficient is 0.84
  - P-type (standard) pitot tube may be used to measure velocity
  - Shortridge multimeter may be used to measure velocity

3.1.3 EPA Method 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 3A is an instrumental test method used to measure the concentration of O_2 and CO_2 in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O_2 and CO_2. The performance requirements of the method must be met to validate data.

Pertinent information regarding the performance of the method is presented below:

- Method Options:

  - A Method 3 like single-point integrated sample is collected at the inlet of the RTO for Molecular Weight determination as part of the Method 4 train
  - If the stratification test provisions in section 8.1.2 of Method 7E are used to reduce the number of required sampling points, the alternative acceptance criterion for three-point sampling will be ±0.5 percent CO_2 or O_2, and the alternative acceptance criterion for single-point sampling will be ±0.3 percent CO_2 or O_2. In that case single-point integrated sampling as described in section 8.2.1 of Method 3 may be used
- Target and/or Minimum Required Sample Duration: 60/240 minutes

3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Condensed water is measured gravimetrically
  - Moisture sampling is performed as part of the pollutant sample trains at the outlet of the RTO
  - Since it is theoretically impossible for measured moisture to be higher than psychrometric moisture, the psychrometric moisture is also calculated, and the lower moisture value is used in the calculations
- Method Exceptions:
  - Moisture sampling is performed as a stand-alone method at a single point in the centroid of the stack at the inlet of the RTO utilizing an unheated probe
- Target and/or Minimum Required Sample Duration: 60/240 minutes
- Minimum Required Sample Volume: 21 scf

3.1.5 EPA Method 23, Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources

EPA Method 23 is a manual, isokinetic method to measure polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) emissions using high resolution gas chromatography with high resolution mass spectroscopy (HRGC/HRMS). The stack gas is sampled through a nozzle, probe, filter, sorbent trap module encased in a water-cooled condenser, and impinger train. Dioxin/furan emissions are reported in emission concentration and emission rate units.

Pertinent information regarding the performance of the method is presented below:

- Method Options:

  - In accordance with recent proposed modifications to EPA Method 23, PCBs and PAHs will be measured with dioxins/difurans
- Method Exceptions:
  - Acetone and toluene are used as the recovery solvents
- Target Analytes
  - Each dioxin and furan congener, as well as totals for each class of congeners
  - Each PCB congener
  - Each PAH and PAH-derivative
  - Chlorobenzene and Chlorophenol
- Estimated Laboratory Analytical Detection Limits:

PAH	EPA 23 MDL (ng)	Observed MDL (ng)	Estimated ISDL (ng/dscm) based on Observed MDL and 120 ft^3 min. sample volume	Estimated conc. based on EF (ng/dscm)
Naphthalene	110.5	2620	771	7111.9
2-Methylnaphthalene	36.3	12.3	3.62	301.4
Acenaphthene (CCC)	31.4	494	145	11.6
Acenaphthylene	11.3	443	130	30.2
Fluorene	12.8	667	196	696.9
Phenanthrene	19.9	90.3	26.6	304.3
Anthracene	11.8	118	34.7	20.7
Fluoranthene (CCC)	9	5.41	1.59	43.7
Pyrene	7.6	4.7	1.38	37.2
Benzo(a)anthracene	6.2	2.82	0.83	278.4
Chrysene	6.2	2.53	0.74	104.8
Benzo(b)fluoranthene,	7.8	1.91	0.56	313.4
Benzo(k)fluoranthene	6.4	2.01	0.59	183.1
Benzo(e)pyrene	3.3	1.85	0.54	10.6
Benzo(a)pyrene (CCC),	15.9	3.54	1.04	660.2
Perylene	28.3	3.66	1.08	0.62
Indeno(1,2,3-cd) pyrene	7.2	2.98	0.88	780.4
Dibenz(a,h) anthracene,	6.8	2.79	0.82	85.3
Benzo(g,h,i) perylene	6.8	2.75	0.81	55.9

- EPA 23 MDL (ng) from revised EPA Method 23, Table 23-19
- Observed MDL (ng) derived from a recent Enthalpy Analytical lab analysis for PAH testing using this test method
- Estimated in stack detection limit (ISDL) is calculated based on the Observed MDL and a minimum sample volume of 120 ft^3
- Estimated PAH concentration is based on submitted Ecolube lb/hr emission factors and using 2,792 dscfm of airflow which was measured during the last source test

PCDDs and PCDFs	EPA 23 MDL (ng)	Observed MDL (ng)	Estimated ISDL (ng/dscm) based on Observed MDL and 120 ft^3 min. sample volume	Estimated conc. based on EF (ng/dscm)
1,2,3,4,6,7,8-HpCDD	0.0236	2.40	0.71	0.221
1,2,3,4,6,7,8-HpCDF	0.0488	2.82	0.83	0.163
1,2,3,4,7,8-HxCDD	0.00926	2.52	0.74	0.0183
1,2,3,4,7,8-HxCDF	0.066	2.20	0.65	0.161
1,2,3,4,7,8,9-HpCDF	0.0246	2.88	0.85	0.00996
1,2,3,6,7,8-HxCDD	0.0106	2.60	0.77	0.0351
1,2,3,6,7,8-HxCDF	0.00772	2.30	0.68	0.0512
1,2,3,7,8-PeCDD	0.0352	3.34	0.98	0.0208
1,2,3,7,8-PeCDF	0.0146	2.40	0.71	0.0717
1,2,3,7,8,9-HxCDD	0.027	2.56	0.75	0.0400
1,2,3,7,8,9-HxCDF	0.00624	2.72	0.80	0.0157
2,3,4,6,7,8-HxCDF	0.0188	2.24	0.66	0.0733
2,3,4,7,8-PeCDF	0.0129	2.46	0.72	0.127
2,3,7,8-TeCDD	0.027	3.20	0.94	0.00415
2,3,7,8-TeCDF	0.018	2.08	0.61	0.748
OCDD	0.175	6.10	1.80	0.392
OCDF	0.0538	3.34	0.98	0.0871

- EPA 23 MDL (ng) from revised EPA Method 23, Table 23-18
- Observed MDL (ng) derived from a recent Enthalpy Analytical lab analysis for PCDD/PCDF testing using this test method
- Estimated ISDL is calculated based on the Observed MDL and a minimum sample volume of 120 ft^3
- Estimated PCDDs and PCDFs concentrations are based on submitted Ecolube lb/hr emission factors and using 2,792 dscfm of airflow which was measured during the last source test

PCBs	Observed MDL (ng)	Estimated ISDL (ng/dscm) based on Observed MDL and 120 ft^3 min. sample volume	Estimated conc. based on EF (ng/dscm)
PCB-8 [2,4′-DiCB]	0.030	0.0088	0.399
PCB-18 [2,4,4′- TrCB]	0.032	0.0094	0.136
PCB-28 [2,4,4′- TrCB]	0.044	0.0129	0.304
PCB-44 [2,2′,3,5′- TeCB]	0.080	0.0235	0.147
PCB-52 [2,2′,5,5′- TeCB]	0.030	0.0088	0.152
PCB-66 [2,3′,4,4′- TeCB]	0.034	0.0100	0.191
PCB-77 [3,3′,4,4′- TeCB]	0.028	0.0082	0.0713
PCB-81 [3,4,4′,5- TeCB]	0.036	0.0106	0.0270
PCB-101 [2,2′,4,5,5′- PeCB]	0.094	0.0277	0.0862
PCB-105 [2,3,3′,4,4′- PeCB]	0.034	0.0100	0.0370
PCB-114 [2,3,4,4′,5- PeCB]	0.030	0.0088	0.00806
PCB-118 [2,3′,4,4′,5- PeCB]	0.060	0.0177	0.0502
PCB-123 [2,3’,4,4′,5’- PeCB]	0.034	0.0100	0.0107
PCB-126 [3,3′,4,4′,5- PeCB]	0.032	0.0094	0.0327
PCB-128 [2,2′,3,3′,4,4′- HxCB]	0.058	0.0171	0.0152
PCB-138 [2,2′,3,4,4′,5′- HxCB]	0.072	0.0212	0.0345
PCB-153 [2,2′,4,4′,5,5′- HxCB]	0.060	0.0177	0.0317
PCB-156 [2,3,3′,4,4′,5- HxCB]	0.046	0.0135	0.0125
PCB-157 [2,3,3′,4,4′,5′- HxCB]	0.046	0.0135	0.00904
PCB-167 [2,3′,4,4′,5,5′- HxCB]	0.026	0.0077	0.00651
PCB-169 [3,3′,4,4′,5,5′- HxCB]	0.030	0.0088	0.00764
PCB-170 [2,2′,3,3′,4,4′,5- HpCB]	0.024	0.0071	0.00896
PCB-180 [2,2′,3,4,4′,5,5′- HpCB]	0.060	0.0177	0.0104
PCB-187 [2,2′,3,4′,5,5′,6- HpCB]	0.034	0.0100	0.00888
PCB-189 [2,3,3′,4,4′,5,5′- HpCB]	0.026	0.0077	0.00824
PCB-195 [2,2′,3,3′,4,4′,5,6- OcCB]	0.044	0.0129	0.00381
PCB-206 [2,2′,3,3′,4,4′,5,5′,6- NoCB]	0.032	0.0094	0.0155
PCB-209 [2,2′,3,3′,4,4′,5,5′,6,6′- DeCB]	0.032	0.0094	0.0136

- EPA 23 MDL (ng) from revised EPA Method 23, Table 23-20
- Observed MDL (ng) is not available and thus not included in this table
- Estimated ISDL is calculated based on the Observed MDL and a minimum sample volume of 120 ft^3
- Estimated PCBs concentrations are based on submitted Ecolube lb/hr emission factors and using 2,792 dscfm of airflow which was measured during the last source test
- Target and/or Minimum Required Sample Duration: 240 minutes. Montrose estimates that the majority of compounds will be detected if sampling for this duration, with a sample rate of at least 30 ft^3/hr. Some compounds that are present in very low concentrations, such as acenaphthylene or perylene, are not expected to be detected in the sample even if testing in excess of 50 hours, but

240 minutes is expected to provide quantitative emission rates for the majority of compounds.

- Target and/or Minimum Required Sample Volume: 120 dscf
- Concentrations for any compounds determined to be below the analytical detection limit will be reported as less-than the detection limit concentration. In these cases, emission rates will be based on the DL concentration, also reported as less-than the calculated emission rate.
- Analytical Laboratory: Enthalpy Analytical, Wilmington, NC

3.1.6 EPA Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

EPA Method 25A is an instrumental test method used to measure the concentration of THC in stack gas. A gas sample is extracted from the source through a heated sample line and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Results are reported in terms of propane ppmvd
- Method Exceptions:
- Target and/or Minimum Required Sample Duration: 60 minutes

3.1.7 EPA Method 9, Visual Determination of the Opacity of Emissions

EPA Method 9 is used to observe the visual opacity of emissions (opacity). The observer stands at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to their back. The line of vision is perpendicular to the plume direction and does not include more than one plume diameter. Observations are recorded at 15-second intervals and are made to the nearest 5% opacity. The qualified observer is certified according to the requirements of EPA Method 9, section 3.1.

- Method Options:
  - Observations are attempted to be made 30 minutes before, during, or within 30 minutes after each concurrent particulate run, unless weather conditions are unfavorable.

3.1.8 EPA Method ALT-011, Alternative Method 2 Thermocouple Calibration

EPA Approved Alternative Method 011 (ALT-011) is used as an alternative to the EPA Method 2 two-point thermocouple calibration. This procedure involves a single-point in-field check using a reference thermometer to confirm that the thermocouple system is operating properly. The temperatures of the thermocouple and reference thermometers shall agree to within ±2 °F.

3.2 PROCESS TEST METHODS

The applicable regulations do not require process samples to be collected during this test program.

4.0 QUALITY ASSURANCE AND REPORTING

4.1 QA AUDITS

Montrose has instituted a rigorous QA/QC program for its air quality testing. Quality assurance audits are performed as part of the test program to ensure that the results are calculated using the highest quality data available. This program ensures that the emissions data we report are as accurate as possible. The procedures included in the cited reference methods are followed during preparation, sampling, calibration, and analysis. Montrose is responsible for preparation, calibration, and cleaning of the sampling apparatus. Montrose will also perform the sampling, sample recovery, storage, and shipping. Approved contract laboratories may perform some of the preparation and sample analyses, as needed.

4.2 QUALITY CONTROL PROCEDURES

Montrose calibrates and maintains equipment as required by the methods performed and applicable regulatory guidance. Montrose follows internal procedures to prevent the use of malfunctioning or inoperable equipment in test programs. All equipment is operated by trained personnel. Any incidence of nonconforming work encountered during testing is reported and addressed through the corrective action system.

4.2.1 Equipment Inspection and Maintenance

Each piece of field equipment that requires calibration is assigned a unique identification number to allow tracking of its calibration history. All field equipment is visually inspected prior to testing and includes pre-test calibration checks as required by the test method or regulatory agency.

4.2.2 Audit Samples

When required by the test method and available, Montrose obtains EPA TNI SSAS audit samples from an accredited provider for analysis along with the samples. Currently, the SSAS program has been suspended pending the availability of a second accredited audit sample provider. If the program is reinstated, the audit samples will be ordered. If required as part of the test program, the audit samples are stored, shipped, and analyzed along with the emissions samples collected during the test program. The audit sample results are reported along with the emissions sample results.

4.3 DATA ANALYSIS AND VALIDATION

Montrose converts the raw field, laboratory, and process data to reporting units consistent with the permit or subpart. Calculations are made using proprietary computer spreadsheets or data acquisition systems. One run of each test method is also verified using a separate example calculation. The example calculations are checked against the spreadsheet results and are included in the final report. The “Standard Conditions” for this project are 29.92 inches of mercury and 68 °F.

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4.4 SAMPLE IDENTIFICATION AND CUSTODY

The on-site Field Project Manager will assume or assign the role of sample and data custodian until relinquishing custody. The sample custodian will follow proper custody procedures before departing from the test site including:

- Assign the unique sample identification number to each sample
- Attach sample labels and integrity seals to all samples
- Complete COC form(s), ensuring that the sample identification numbers on the samples match the sample identification numbers on the COC
- Pack and store samples in accordance with the test method requirements in appropriate transport containers for protection from breakage, contamination, or loss
- Keep samples in a secure locked area if not in the direct presence of Montrose staff

The sample custodian will follow proper custody procedures upon arriving at the Montrose office including:

- Remove samples and COC documents from vehicles and check into designated secure sample holding areas
- Store samples requiring additional measures such as refrigeration or dry ice appropriately

4.5 QUALITY STATEMENT

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the appendices. The content of this test plan is modeled after the EPA Emission Measurement Center Guideline Document (GD-042).

4.6 REPORTING

Montrose will prepare a final report to present the test data, calculations/equations, descriptions, and results. Prior to release by Montrose, each report is reviewed and certified by the project manager and their supervisor, or a peer. Source test reports will be submitted to the facility or appropriate regulatory agency (upon customer approval) within 60 days of the completion of the field work. The report will include a series of appendices to present copies of the intermediate calculations and example calculations, raw field data, laboratory analysis data, process data, and equipment calibration data.

4.6.1 Example Report Format

The report is divided into various sections describing the different aspects of the source testing program. Table 4-1 presents a typical Table of Contents for the final report.

TABLE 4-1
TYPICAL REPORT FORMAT

4.6.2 Example Presentation of Test Results

Table 4-2 presents the typical tabular format that is used to summarize the results in the final source test report. Separate tables will outline the results for each target analyte and compare them to their respective emissions limits.

TABLE 4-2
EXAMPLE EMISSIONS RESULTS -
RTO #1

Run Number	**1**	**2**	**3**	**Average**
Date	X	X	X	--
Time	X	X	X	--
Process Data				
parameter 1, units	X	X	X	X
parameter 2, units	X	X	X	X
Flue Gas Parameters				
sampling duration, minutes	X	X	X	X
O_2, % volume dry	X	X	X	X
CO_2, % volume dry	X	X	X	X
flue gas temperature, °F	X	X	X	X
moisture content, % volume	X	X	X	X
volumetric flow rate, dscfm	X	X	X	X
VOC In/Out				
ppmvd as Propane	X	X	X	X
lb/hr	X	X	X	X
Destruction Efficiency	X	X	X	X

Appendix E.2
Permit Excerpts

1.0 GENERAL EMISSION STANDARDS AND LIMITS

1.1. Visible Emissions

The permittee must not allow visible emission from any air contaminant sources other than fugitive emission sources to equal or exceed 20%. Opacity must be measured as a six-minute block average using EPA Method 9, a continuous opacity monitoring system (COMS) installed and operated in accordance with the DEQ Continuous Monitoring Manual or 40 CFR part 60, or an alternative monitoring method approved by DEQ that is equivalent to EPA Method 9.

1.2. Particulate Matter Emissions

The permittee must comply with the following particulate matter emission limits, as applicable:

a. Particulate matter emissions from any fuel burning equipment installed, constructed, or modified before April 16, 2015 must not exceed 0.14 grains per dry standard cubic foot, corrected to 12% CO_2 or 50% excess air.

b. Particulate matter emissions from any fuel burning equipment installed, constructed, or modified on or after April 16, 2015 must not exceed 0.10 grains per dry standard cubic foot, corrected to 12% CO_2 or 50% excess air.

c. Particulate matter emissions from any fuel burning equipment, except natural gas and liquefied petroleum gas fuel burning equipment, must not exceed the emission rate shown in Figure 1 of OAR 340-208-0610 as a function of the maximum heat input when using all other fuels, except natural gas and LPG

d. Particulate matter emissions from any air contaminant source installed, constructed, or modified before April 16, 2015 other than fuel burning equipment and fugitive emission sources must not exceed 0.14 grains per dry standard cubic foot.

e. Particulate matter emissions from any air contaminant source installed, constructed, or modified on or after April 16, 2015 other than fuel burning equipment and fugitive emission sources must not exceed 0.10 grains per dry standard cubic foot.

1.3. Fugitive Emissions

The permittee must take reasonable precautions to prevent fugitive dust emissions, as measured by EPA method 22, by:

a. Using, where possible, water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

b. Applying water or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces which can create airborne dusts;

c. Enclosing (full or partial) materials stockpiles in cases where application of water or other suitable chemicals are not sufficient to prevent particulate matter from becoming airborne;

3.0 PLANT SITE EMISSION LIMITS

3.1. Plant Site Emission Limits (PSEL)

The permittee must not cause or allow plant site emissions to exceed the following:

Pollutant	Limit	Units
PM	24	tons per year
PM_{10}	14	tons per year
$PM_{2.5}$	9	tons per year
SO_2	39	tons per year
NO_X	39	tons per year
CO	99	tons per year
VOC	39	tons per year
GHG (CO_2e)	74,000	tons per year

3.2. Annual Period

The annual plant site emissions limits apply to any 12-consecutive calendar month period.

4.0 COMPLIANCE DEMONSTRATION AND SOURCE TESTING

4.1. Source Testing Requirements

In addition to the testing required by the compliance schedule in Condition 6.0, the permittee must demonstrate that the thermal oxidizer continues to operate at a minimum VOC control efficiency of 97% by conducting a source test for VOC emissions at the inlet and outlet of the oxidizer, every 24 months from the latest valid test, using the following test methods and procedures:

a. EPA method 25, 25A or 18 must be used for VOC emissions;

b. Control device efficiency testing must be conducted while the associated equipment is operating at 90 to 110% of normal maximum production;

c. The following parameters must be monitored and recorded during the source test:

   i. Visible emissions using EPA method 9 within 30 minutes before, during, or 30 minutes after each test run;

   ii. Process operating parameters for each system exhausted to the oxidizer;

iii. Thermal oxidizer operating parameters, including temperature and flow rate;

iv. Type and amount of product processed thru each process (refinery, sulfonation, oil polishing); and

v. Type and quantity of fuel burned in each device (heater 3, heater 4, steam boilers, thermal oxidizer)

d. All tests must be conducted in accordance with DEQ's Source Sampling Manual and the approved pretest plan. The pretest plan must be submitted at least 30 days in advance and approved by the Regional Source Test Coordinator. Test data and results must be submitted for review to the Regional Source Test Coordinator within 60 days unless otherwise approved in the pretest plan.

e. Only regular operating staff may adjust the combustion system or production processes and emission control parameters during the source test and within two hours prior to the source test. Any operating adjustments made during the source test, which are a result of consultation with source testing personnel, equipment vendors or consultants, may render the source test invalid.

f. The permittee must make appropriate repairs to the VOC control system and repeat any source test that does not demonstrate a minimum of 97% VOC control efficiency. The retest must be completed within 90 days of any failed or invalid source test.

4.2. Monitoring Requirements

The permittee must monitor the operation and maintenance of the plant and associated air contaminant control devices as follows:

a. Temperature of the thermal oxidizer combustion chamber at all times when associated processes are in operation - continuously

b. Type, quantity, sulfur and metals content of fuels for each oil heater (HTR-3 and HTR-4) – monthly and when oil is added to the fuel tank(s)

c. Type, quantity, sulfur and metals content of oil entering and exiting the oil polishing system (OPS-1) – weekly (testing of entering and exiting oil must correlate to the same product)

d. Quantity of sulfur used in the sulfonation process – weekly

e. Type and quantity of used oil and other products received at the facility - monthly

f. Type and quantity of each product produced at the facility – monthly

g. True vapor pressure of petroleum liquids stored in each tank - monthly

h. Fence line visible observations using EPA method 22 – weekly

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If you have any questions, please contact one of the following individuals by email or phone.

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