SOURCE TEST REPORT
2021 SOURCE TESTING
ACUTE HEALTH RISK
COVANTA MARION, INC.
SOLID WASTE COMBUSTOR UNIT 1
BROOKS, OREGON

Prepared For:

Covanta Marion, Inc.
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Brooks, OR 97305

For Submittal To:

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Portland, OR 97232

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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: Peter Becker Date: 01 / 31 / 2022

Name: Peter Becker 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: 01 / 31 / 2022

Name: Amber Little Title: Reporting Hub Manager

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1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Covanta Marion, Inc. (Covanta) contracted Montrose Air Quality Services, LLC (Montrose) to perform an emissions test program on Solid Waste Combustors Units 1 and 2 at their facility located in Brooks, Oregon. The tests were conducted to measure specific reportable Toxic Air Contaminants (TAC) included under OAR 340-245-8020 for the purposes of generating representative emissions inventory pursuant to OAR 340-245-0040 for the Cleaner Air Oregon (CAO) program.

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

TABLE 1-1
SUMMARY OF TEST PROGRAM

Test Date	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
12/7/2021	Unit 1	Velocity/Volumetric Flow Rate	EPA 1 & 2	2	60/120
“”	“”	O_2, CO_2	EPA 3A	2	120
“”	“”	Moisture	EPA 4	2	60/120
“”	“”	HCl, HF	Mod. EPA 26A	2	60
“”	“”	Multi-Metals	EPA 29	2	120
“”	“”	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. 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 1-2. The tests were conducted according to the test plan (protocol) dated November 24, 2021 that was submitted to the ODEQ and approved on December 3, 2021.

1.2 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location:	Covanta Marion, Inc. 4850 Brooklake Road Brooks, OR 97305	
Project Contact:	Andrew Willis	Jeffrey Hahn
Role:	Environmental Compliance Specialist	Consultant
Company:	Covanta	Covanta
Telephone:	503-979-1807	201-723-6447
Email:	awillis@covanta.com	jhahn@covanta.com

Agency Information

Regulatory Agency:	Oregon DEQ	
Agency Contact:	Kenzie Billings	Thomas Rhodes
Telephone:	503-229-5247	503-229-5534
Email:	kenzie.billings@deq.oregon.gov	thomas.rhodes@deq.oregon.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC	
Contact:	Peter Becker	Kristina Schafer
Title:	Client Project Manager	Hub District Manager
Telephone:	330-285-6884	253-480-3801
Email:	pbecker@montrose-env.com	kschafer@montrose-env.com

Laboratory Information

Laboratory:	Enthalpy Analytical
City, State:	Durham, NC
Method:	EPA Mod. 26A, EPA 29

Test personnel and observers are summarized in Table 1-2.

TABLE 1-2
TEST PERSONNEL AND OBSERVERS

Name	Affiliation	Role/Responsibility
Kevin Crosby	Montrose	Test Coordinator
Peter Becker	Montrose	Project Manager/Field Team Leader/Qualified Individual (QI)/Trailer operator/Sample recovery/Sample train operator
Esha Chetty	Montrose	Sample recovery
Sebastian Wolfendale	Montrose	Stack Lead
Austin Goracke	Montrose	Sample train operator
Preston Bauder	Montrose	Sample train operator
Lesley Wolf	Montrose	Sample train operator
Andy Vella	Montrose	Calculations and report preparation
Andrew Willis	Covanta	Observer/Client Liaison/Test Coordinator
Paul Kantola	Covanta	Corporate EHS
Jeff Hahn	Covanta	Consultant
Kenzie Billings	Oregon DEQ	CAO Project Manager
Thomas Rhodes	Oregon DEQ	CAO Source Test Coordinator

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

The Marion County Solid Waste-to-Energy Facility is located in Brooks, Oregon. The facility consists of two identical municipal solid waste-fired boilers of Martin GmbH Stoker Combustion System design. The combustors each have a capacity greater than 250 tons per day. The facility produces up to 13.1 MW of electricity daily. Each MWC unit exhausts through a common flue stack. Air pollution equipment for each independent train includes semi-dry flue gas scrubbers for acid gas control, fabric filter for particulate removal, selective non-catalytic reduction (SNCR) for control of nitrogen oxides and dry activated carbon injection for mercury emission controls. Each unit is also equipped with a continuous emission monitoring system to monitor emissions of nitrogen oxides, sulfur dioxide, carbon monoxide, and related process parameters.

2.2 FLUE GAS SAMPLING LOCATIONS

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

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
Unit 1 Stack	48	1200 / 25	1440 / 30	Isokinetic: 12 (6/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

Emission testing was performed under two distinct operating scenarios which included:

- A low fire/reduced steam load (80-90% of design steam load) to provide results used in calculation of acute health risk, and
- A high fire/increased steam load (90-110% of design steam load) to characterize chronic health risk.

The design steam load capacity is approximately 67 Klbs/hr. CMI operated under "worst case" conditions (refer to operating scenarios referenced above) for the Cleaner Air Oregon required testing, as described in detail in Section 2.9 of the DEQ Source Sampling Manual, i.e., both the low fire/reduced steam load and the high fire/increased steam load operating scenarios.

The “low fire/reduced steam load” scenario, which represents the maximum “worst case” boiler operating condition, would only occur in a few hours of operation in any given year. The results from the low fire operating scenario are presented in this test report.

The fuel processed during testing primarily consisted of municipal solid waste and other approved wastes (e.g., regulated medical waste, industrial solid wastes, liquid waste). CMI tracked the amounts of regulated medical waste and liquid wastes processed in each unit as well as the amount of industrial waste that was received during each testing day. These parameters are summarized in a supplemental document to this report. Operating data including continuous emissions monitoring (CEM), continuous opacity monitoring (COM), continuous parameter monitoring (CPM), and reagent feed rates are presented in Appendix B. These include:

- Steam flow, 1000 lb/hr
- Baghouse inlet temperature, °F
- Carbon injection rate, lb/hr
- Lime flow, lb/hr
- Ammonia flow, gph
- Auxiliary natural gas flow, kscfh
- NO_X, ppm (@ 7% O_2)
- SO_2, ppm (@ 7% O_2)
- CO, ppm (@ 7% O_2)
- Opacity (%)

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 samples or 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.

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

- Method Options: NA
- Method Exceptions: None

The sample port and traverse point locations are detailed in Appendix A.

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 is used to measure velocity
    - ALT-011 used to verify thermocouple functionality
- Method Exceptions: None

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

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

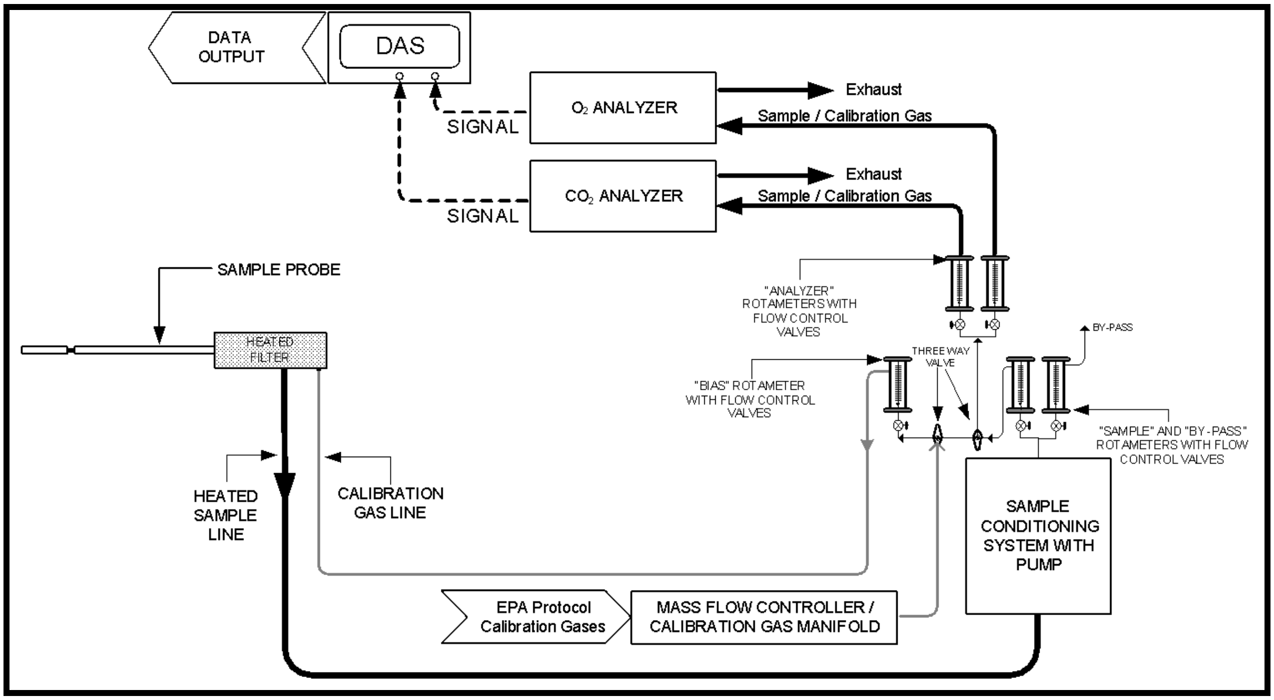
EPA Method 3A is an instrumental test method used to measure the concentration of O_2 and CO_2 in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O_2 and CO_2. The performance requirements of the method must be met to validate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

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

- Method Options:
  - Calibration span values are 23.04% O_2 and 22.66% CO_2
- Method Exceptions: None
- Target and/or Minimum Required Sample Duration: 120 minutes (concurrent with EPA Method 29)

The typical sampling system is detailed in Figure 3-1.

FIGURE 3-1
US EPA METHOD 3A (O_2/CO_2) 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:
  - The reference method is used to measure moisture
  - Moisture sampling is performed as part of the pollutant sample trains
  - 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: None
- Target and/or Minimum Required Sample Duration: Concurrent with Mod. EPA Method 26A and EPA Method 29 sampling
- Target and/or Minimum Required Sample Volume: 21 scf

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

3.1.5 EPA Method 26A, Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method

EPA Method 26A is a manual, isokinetic method used to measure hydrogen chloride and hydrogen fluoride emissions from stationary sources. Gaseous and particulate pollutants are withdrawn isokinetically from the source and collected in an optional cyclone, on a filter, and in absorbing solutions. The cyclone collects any liquid droplets and is not necessary if the source emissions do not contain them; however, it is preferable to include the cyclone in the sampling train to protect the filter from any liquid present. The filter collects particulate matter including halide salts but is not routinely recovered or analyzed. Acidic and alkaline absorbing solutions collect the gaseous hydrogen halides and halogens, respectively. Following sampling of emissions containing liquid droplets, any halides/halogens dissolved in the liquid in the cyclone and on the filter are vaporized to gas and collected in the impingers by pulling conditioned ambient air through the sampling train. The hydrogen halides are solubilized in the acidic solution and form chloride (Cl^-), bromide (Br^-), and fluoride (F^-) ions. The halogens have a very low solubility in the acidic solution and pass through to the alkaline solution where they are hydrolyzed to form a proton (H^+), the halide ion, and the hypohalous acid (HClO or HBrO). Sodium thiosulfate is added to the alkaline solution to assure reaction with the hypohalous acid to form a second halide ion such that two halide ions are formed for each molecule of halogen gas. The halide ions in the separate solutions are measured by ion chromatography (IC). If desired, the particulate matter recovered from the filter and the probe is analyzed following the procedures in Method 5.

NOTE: If the tester intends to use this sampling arrangement to sample concurrently for particulate matter, the alternative Teflon probe liner, cyclone, and filter holder should not be used. The Teflon filter support must be used. The tester must also meet the probe and filter temperature requirements of both sampling trains.

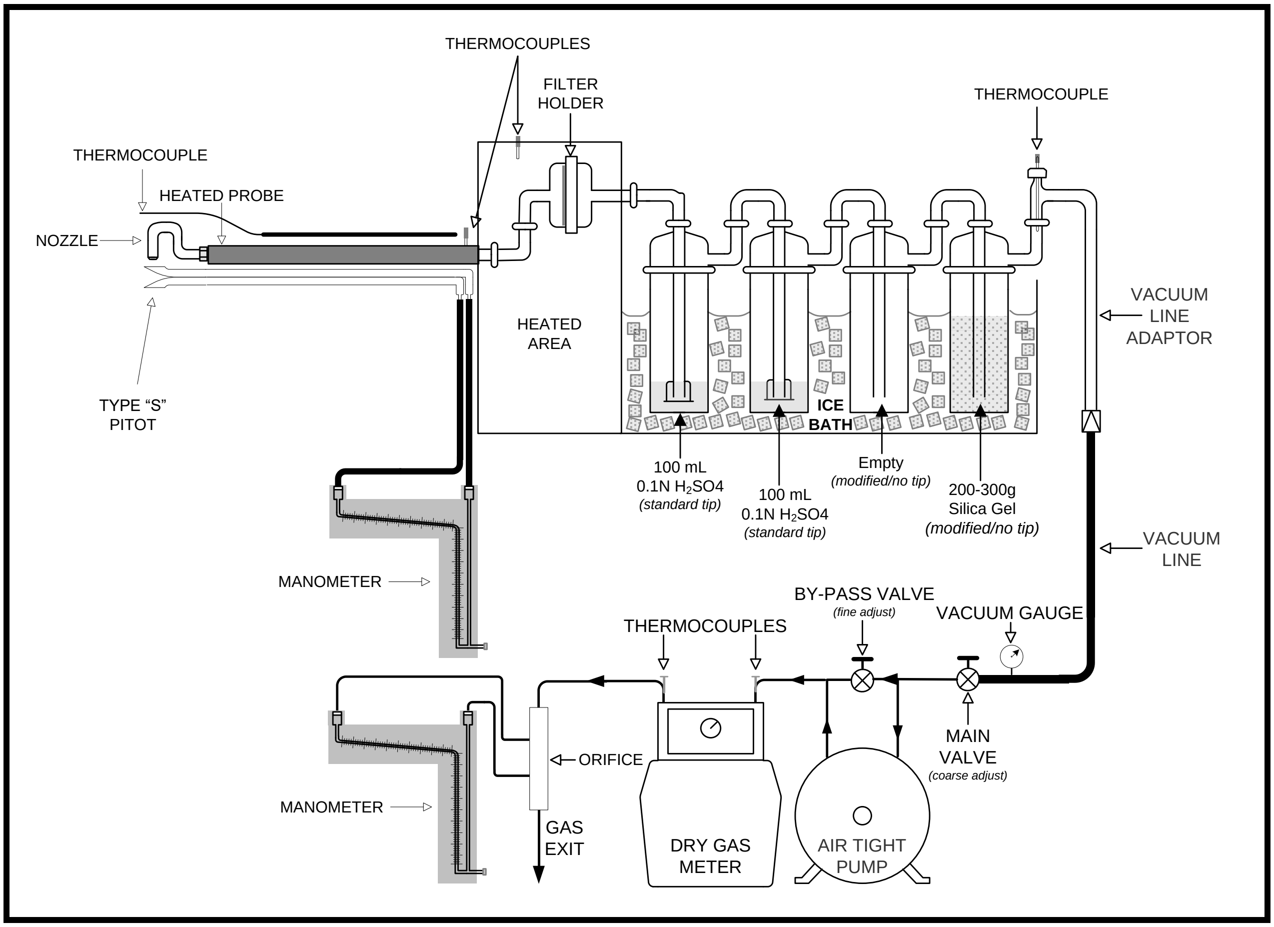
Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - The impingers used to capture halogens are eliminated because halogens are not target analytes
- Method Exceptions:

  - Since only gaseous emissions are of interest and there are no droplets in the gas stream, samples are collected non-isokinetically
- Target and/or Minimum Required Sample Duration: 60 minutes
- Target and/or Minimum Required Sample Volume: 30 dscf
- Analytical Laboratory: Enthalpy Analytical, Durham, NC

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

FIGURE 3-2
US EPA METHOD 26A (HALIDES) SAMPLING TRAIN



3.1.6 EPA Method 29, Determination of Metals Emissions from Stationary Sources

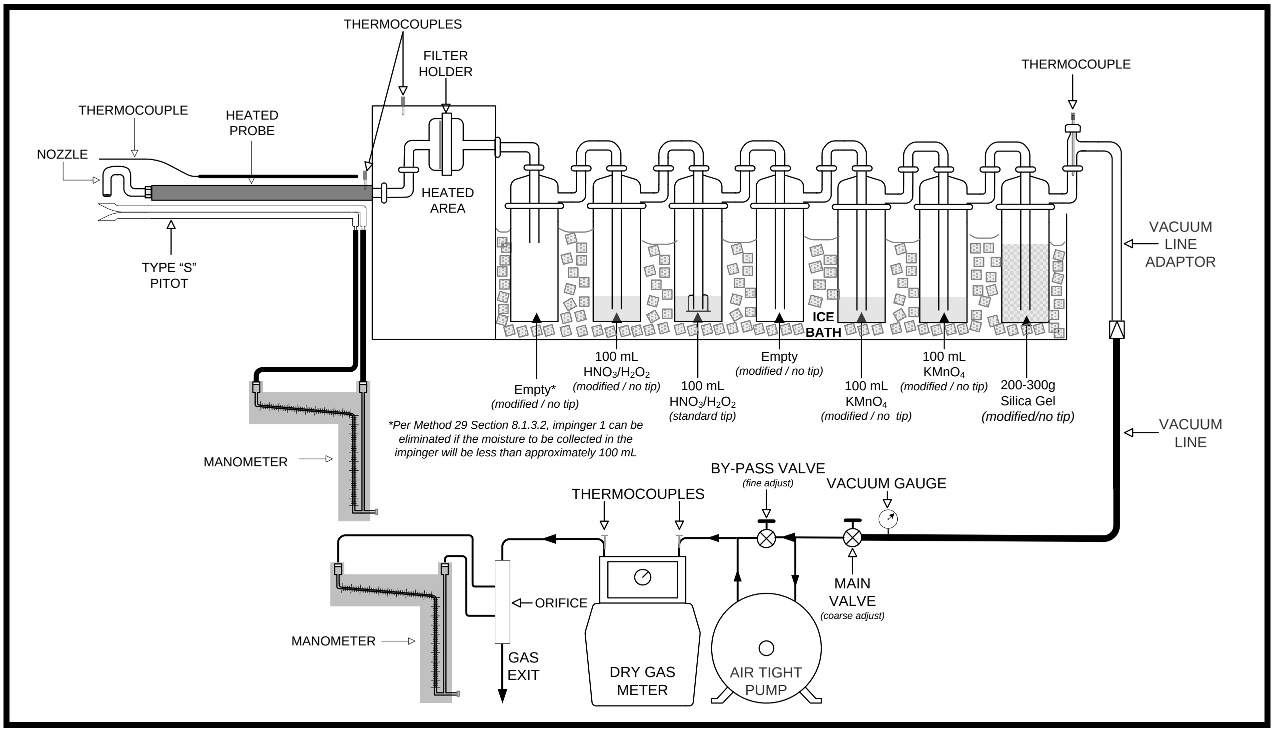
EPA Method 29 is a manual, isokinetic test method to measure a variety of metals using inductively coupled argon plasma emission spectroscopy (ICAP) and cold vapor atomic absorption (CVAA) spectroscopy. This method is performed in conjunction with EPA Methods 1-4. A stack sample is withdrawn isokinetically from the source, filterable emissions are collected in the probe and on a heated filter, and condensable emissions are collected in an aqueous acidic solution of hydrogen peroxide (analyzed for all target analytes) and an optional aqueous acidic solution of potassium permanganate (required only when Hg is a target analyte). The recovered samples are digested, and appropriate fractions are analyzed for the target analytes which may include Hg by CVAAS and for Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, P, Se, Ag, Tl, and Zn by ICAP or atomic absorption spectroscopy (AAS). Graphite furnace atomic absorption spectroscopy (GFAAS) is used for analysis of Sb, As, Cd, Co, Pb, Se, and Tl if these elements require greater analytical sensitivity than can be obtained using ICAP. AAS may be used for analysis of all target analytes if the resulting in-stack method detection limits meet the goal of the testing program. Similarly, inductively coupled plasma-mass spectroscopy (ICP-MS) may be used for analysis of Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, Ag, Tl and Zn. The results from analysis of individual fractions of the sample train are summed to obtain the total concentration of each metal per sample train.

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

- Method Options:
  - The method is performed for the following target analytes: Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Phosphorus (P), Selenium (Se), Silver (Ag), Thallium (Tl), Zinc (Zn); plus Aluminum (Al), Iron (Fe), Molybdenum (Mo), Potassium (K), and Vanadium (V)
- Method Exceptions:
  - Al, Fe, Mo, K and V are not standard analytes of the test method but were quantified by the laboratory
- Target and/or Minimum Required Sample Duration: 120 minutes
- Target Sample Volume: 60 dscf
- Analytical Laboratory: Enthalpy Analytical, Durham, NC

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

FIGURE 3-3
US EPA METHOD 29 SAMPLING TRAIN



3.1.7 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

Only two test runs of the Acute Health Risk test methods were performed due to operational interruption. Covanta was informed of a disruption in the delivery of the leachate from the Marion County ash monofill, which prevented completion of the remaining testing due to insufficient quantities of leachate to meet minimum feed rates outlined in the DEQ-approved source test plan.

EPA 26A sampling for HCl and HF should have been performed isokinetically, but was not. A non-isokinetic approach was proposed in the Source Test Plan but was not accepted by the Oregon DEQ, and Montrose was not aware of the rejection until after testing had been completed.

Molybdenum analysis was not performed on the sample filters. The electron tunnel microscope analysis may be destructive to the filter, so it could not be done on the EPA Method 29 filters, and had to be done on the modified EPA Method 26A filters. However, the analysis is meant to be performed on a filter from an isokinetic test run, and Mod. EPA 26A was not sampled isokinetically. The samples were submitted anyway but the laboratory (MVA) informed Montrose there was not enough particulate on the filter to do an analysis.

4.2 PRESENTATION OF RESULTS

The results of individual test runs performed are presented in Tables 4-1 and 4-2. 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
HCl/HF EMISSIONS RESULTS - UNIT 1

Run Number	**1**	**2**	**Average**
Date	12/7/2021	12/7/2021	--
Time	1337-1437	1605-1705	--
Process Data			
steam rate, 1000 lb/hr	61.0	55.3	58.2
baghouse inlet temperature, °F	288	312	300
carbon injection rate, lb/hr	9.46	9.57	9.52
lime flow, lb/hr	254.5	254.3	254.4
ammonia flow, gph	0.7	0.6	0.7
aux. natural gas flow, kscfh	0.2	0.2	0.2
Sampling & Flue Gas Parameters			
sample duration, minutes	60	60	--
sample volume, dscf	43.8	43.3	43.6
O_2, % volume dry	13.4	14.4	13.9
CO_2, % volume dry	6.3	5.4	5.9
flue gas temperature, °F	221	230	225
moisture content, % volume	13.4	10.8	12.1
volumetric flow rate, dscfm	41,231	44,435	42,833
Hydrochloric Acid (HCl)			
mg	6.5	10.6	8.6
ppmvd	3.46	5.70	4.58
ppmvd @ 7% O_2	6.43	12.2	9.30
lb/hr	0.809	1.44	1.12
lb/1000 lb steam	0.0133	0.0260	0.0196
Hydrofluoric Acid (HF)			
mg	<22.1	<22.6	<22.4
ppmvd	<0.0214	<0.0221	<0.0218
ppmvd @ 7% O_2	<0.0398	<0.0472	<0.0435
lb/hr	$<2.75 \times 10^{-3}$	$<3.06 \times 10^{-3}$	$<2.91 \times 10^{-3}$
lb/1000 lb steam	$<4.51 \times 10^{-5}$	$<5.54 \times 10^{-5}$	$<5.02 \times 10^{-5}$

TABLE 4-2
METALS EMISSIONS RESULTS - UNIT 1

Run Number	**1**	**2**	**Average**
Date	12/7/2021	12/7/2021	--
Time	1337-1545	1605-1812	--
Process Data			
steam rate, 1000 lb/hr	58.9	54.4	56.7
baghouse inlet temperature, °F	295	310	303
carbon injection rate, lb/hr	9.55	9.54	9.55
lime flow, lb/hr	255.5	253.8	254.7
ammonia flow, gph	0.8	1.0	0.9
aux. natural gas flow, kscfh	0.2	0.2	0.2
Sampling & Flue Gas Parameters			
sample duration, minutes	120	120	--
sample volume, dscf	75.3	78.9	77.1
isokinetic rate, %	98.5	97.3	--
O_2, % volume dry	13.4	14.4	13.9
CO_2, % volume dry	6.3	5.4	5.9
flue gas temperature, °F	223	231	227
moisture content, % volume	14.0	11.7	12.9
volumetric flow rate, dscfm	42,010	44,974	43,492
Aluminum			
µg	153.4	111.7	132.5
mg/dscm	0.072	0.050	0.061
mg/dscm @ 7% O_2	0.13	0.11	0.12
lb/hr	1.13×10^{-2}	8.42×10^{-3}	9.86×10^{-3}
lb/1000 lb steam	1.92×10^{-4}	1.55×10^{-4}	1.73×10^{-4}
Antimony			
µg	<0.33	0.66	<0.49
mg/dscm	$<1.53 \times 10^{-4}$	2.96×10^{-4}	$<2.25 \times 10^{-4}$
mg/dscm @ 7% O_2	$<2.85 \times 10^{-4}$	6.31×10^{-4}	$<4.58 \times 10^{-4}$
lb/hr	$<2.41 \times 10^{-5}$	4.98×10^{-5}	$<3.70 \times 10^{-5}$
lb/1000 lb steam	$<4.10 \times 10^{-7}$	9.16×10^{-7}	$<6.63 \times 10^{-7}$
Arsenic			
µg	<0.53	<0.72	<0.62
mg/dscm	$<2.47 \times 10^{-4}$	$<3.22 \times 10^{-4}$	$<2.85 \times 10^{-4}$
mg/dscm @ 7% O_2	$<4.60 \times 10^{-4}$	$<6.87 \times 10^{-4}$	$<5.73 \times 10^{-4}$
lb/hr	$<3.88 \times 10^{-5}$	$<5.43 \times 10^{-5}$	$<4.66 \times 10^{-5}$
lb/1000 lb steam	$<6.59 \times 10^{-7}$	$<9.98 \times 10^{-7}$	$<8.29 \times 10^{-7}$

TABLE 4-2
METALS EMISSIONS RESULTS CONTINUED - UNIT 1

Run Number	**1**	**2**	**Average**
Barium			
µg	1.99	1.93	1.96
mg/dscm	9.34×10^{-4}	8.65×10^{-4}	8.99×10^{-4}
mg/dscm @ 7% O_2	1.74×10^{-3}	1.84×10^{-3}	1.79×10^{-3}
lb/hr	1.47×10^{-4}	1.46×10^{-4}	1.46×10^{-4}
lb/1000 lb steam	2.49×10^{-6}	2.68×10^{-6}	2.58×10^{-6}
Beryllium			
µg	<0.06	<0.06	<0.06
mg/dscm	$<2.86 \times 10^{-5}$	$<2.74 \times 10^{-5}$	$<2.80 \times 10^{-5}$
mg/dscm @ 7% O_2	$<5.33 \times 10^{-5}$	$<5.84 \times 10^{-5}$	$<5.59 \times 10^{-5}$
lb/hr	$<4.50 \times 10^{-6}$	$<4.61 \times 10^{-6}$	$<4.56 \times 10^{-6}$
lb/1000 lb steam	$<7.64 \times 10^{-8}$	$<8.48 \times 10^{-8}$	$<8.06 \times 10^{-8}$
Cadmium			
µg	1.32	0.31	0.82
mg/dscm	6.18×10^{-4}	1.40×10^{-4}	3.79×10^{-4}
mg/dscm @ 7% O_2	1.15×10^{-3}	2.99×10^{-4}	7.24×10^{-4}
lb/hr	9.71×10^{-5}	2.36×10^{-5}	6.04×10^{-5}
lb/1000 lb steam	1.65×10^{-6}	4.34×10^{-7}	1.04×10^{-6}
Chromium			
µg	9.22	7.18	8.20
mg/dscm	4.32×10^{-3}	3.22×10^{-3}	3.77×10^{-3}
mg/dscm @ 7% O_2	8.04×10^{-3}	6.86×10^{-3}	7.45×10^{-3}
lb/hr	6.80×10^{-4}	5.41×10^{-4}	6.10×10^{-4}
lb/1000 lb steam	1.15×10^{-5}	9.95×10^{-6}	1.07×10^{-5}
Cobalt			
µg	<0.27	0.25	<0.26
mg/dscm	$<1.28 \times 10^{-4}$	1.11×10^{-4}	$<1.20 \times 10^{-4}$
mg/dscm @ 7% O_2	$<2.38 \times 10^{-4}$	2.37×10^{-4}	$<2.38 \times 10^{-4}$
lb/hr	$<2.01 \times 10^{-5}$	1.87×10^{-5}	$<1.94 \times 10^{-5}$
lb/1000 lb steam	$<3.42 \times 10^{-7}$	3.44×10^{-7}	$<3.43 \times 10^{-7}$
Copper			
µg	1.68	2.39	2.03
mg/dscm	7.86×10^{-4}	1.07×10^{-3}	9.28×10^{-4}
mg/dscm @ 7% O_2	1.46×10^{-3}	2.28×10^{-3}	1.87×10^{-3}
lb/hr	1.24×10^{-4}	1.80×10^{-4}	1.52×10^{-4}
lb/1000 lb steam	2.10×10^{-6}	3.31×10^{-6}	2.70×10^{-6}

TABLE 4-2
METALS EMISSIONS RESULTS CONTINUED - UNIT 1

Run Number	1	2	Average
Iron			
µg	380	299	339
mg/dscm	1.78×10^{-1}	1.34×10^{-1}	1.56×10^{-1}
mg/dscm @ 7% O_2	3.31×10^{-1}	2.85×10^{-1}	3.08×10^{-1}
lb/hr	2.80×10^{-2}	2.25×10^{-2}	2.53×10^{-2}
lb/1000 lb steam	4.75×10^{-4}	4.14×10^{-4}	4.45×10^{-4}
Lead			
µg	1.15	2.75	1.95
mg/dscm	5.39×10^{-4}	1.23×10^{-3}	8.85×10^{-4}
mg/dscm @ 7% O_2	1.00×10^{-3}	2.62×10^{-3}	1.81×10^{-3}
lb/hr	8.48×10^{-5}	2.07×10^{-4}	1.46×10^{-4}
lb/1000 lb steam	1.44×10^{-6}	3.81×10^{-6}	2.62×10^{-6}
Manganese			
µg	5.00	15.9	10.4
mg/dscm	2.34×10^{-3}	7.11×10^{-3}	4.73×10^{-3}
mg/dscm @ 7% O_2	4.36×10^{-3}	1.52×10^{-2}	9.76×10^{-3}
lb/hr	3.68×10^{-4}	1.20×10^{-3}	7.83×10^{-4}
lb/1000 lb steam	6.25×10^{-6}	2.20×10^{-5}	1.41×10^{-5}
Mercury			
µg	<1.81	<2.57	<2.19
mg/dscm	$<8.49 \times 10^{-4}$	$<1.15 \times 10^{-3}$	$<9.99 \times 10^{-4}$
mg/dscm @ 7% O_2	$<1.58 \times 10^{-3}$	$<2.45 \times 10^{-3}$	$<2.01 \times 10^{-3}$
lb/hr	$<1.33 \times 10^{-4}$	$<1.93 \times 10^{-4}$	$<1.63 \times 10^{-4}$
lb/1000 lb steam	$<2.27 \times 10^{-6}$	$<3.56 \times 10^{-6}$	$<2.91 \times 10^{-6}$
Molybdenum			
µg	<3.05	<3.06	<3.06
mg/dscm	$<1.43 \times 10^{-3}$	$<1.37 \times 10^{-3}$	$<1.40 \times 10^{-3}$
mg/dscm @ 7% O_2	$<2.66 \times 10^{-3}$	$<2.92 \times 10^{-3}$	$<2.79 \times 10^{-3}$
lb/hr	$<2.25 \times 10^{-4}$	$<2.31 \times 10^{-4}$	$<2.28 \times 10^{-4}$
lb/1000 lb steam	$<3.82 \times 10^{-6}$	$<4.24 \times 10^{-6}$	$<4.03 \times 10^{-6}$
Nickel			
µg	5.63	4.33	4.98
mg/dscm	2.64×10^{-3}	1.94×10^{-3}	2.29×10^{-3}
mg/dscm @ 7% O_2	4.91×10^{-3}	4.13×10^{-3}	4.52×10^{-3}
lb/hr	4.15×10^{-4}	3.26×10^{-4}	3.71×10^{-4}
lb/1000 lb steam	7.05×10^{-6}	6.00×10^{-6}	6.52×10^{-6}

TABLE 4-2
METALS EMISSIONS RESULTS CONTINUED - UNIT 1

Run Number	1	2	Average
Phosphorus			
µg	5.54	3.98	4.76
mg/dscm	2.60×10^{-3}	1.78×10^{-3}	2.19×10^{-3}
mg/dscm @ 7% O_2	4.83×10^{-3}	3.80×10^{-3}	4.32×10^{-3}
lb/hr	4.08×10^{-4}	3.00×10^{-4}	3.54×10^{-4}
lb/1000 lb steam	6.93×10^{-6}	5.51×10^{-6}	6.22×10^{-6}
Potassium			
µg	79.0	72.3	75.6
mg/dscm	3.70×10^{-2}	3.24×10^{-2}	3.47×10^{-2}
mg/dscm @ 7% O_2	6.89×10^{-2}	6.90×10^{-2}	6.90×10^{-2}
lb/hr	5.82×10^{-3}	5.45×10^{-3}	5.64×10^{-3}
lb/1000 lb steam	9.88×10^{-5}	1.00×10^{-4}	9.95×10^{-5}
Selenium			
µg	<0.37	<0.31	<0.34
mg/dscm	$<1.73 \times 10^{-4}$	$<1.40 \times 10^{-4}$	$<1.56 \times 10^{-4}$
mg/dscm @ 7% O_2	$<3.22 \times 10^{-4}$	$<2.98 \times 10^{-4}$	$<3.10 \times 10^{-4}$
lb/hr	$<2.72 \times 10^{-5}$	$<2.35 \times 10^{-5}$	$<2.54 \times 10^{-5}$
lb/1000 lb steam	$<4.62 \times 10^{-7}$	$<4.32 \times 10^{-7}$	$<4.47 \times 10^{-7}$
Silver			
µg	0.23	0.15	0.19
mg/dscm	1.06×10^{-4}	6.87×10^{-5}	8.72×10^{-5}
mg/dscm @ 7% O_2	1.97×10^{-4}	1.46×10^{-4}	1.72×10^{-4}
lb/hr	1.66×10^{-5}	1.16×10^{-5}	1.41×10^{-5}
lb/1000 lb steam	2.82×10^{-7}	2.13×10^{-7}	2.47×10^{-7}
Thallium			
µg	<0.11	<0.11	<0.11
mg/dscm	$<5.21 \times 10^{-5}$	$<4.98 \times 10^{-5}$	$<5.09 \times 10^{-5}$
mg/dscm @ 7% O_2	$<9.69 \times 10^{-5}$	$<1.06 \times 10^{-4}$	$<1.02 \times 10^{-4}$
lb/hr	$<8.19 \times 10^{-6}$	$<8.38 \times 10^{-6}$	$<8.28 \times 10^{-6}$
lb/1000 lb steam	$<1.39 \times 10^{-7}$	$<1.54 \times 10^{-7}$	$<1.47 \times 10^{-7}$
Vanadium			
µg	<6.11	<6.12	<6.12
mg/dscm	$<2.86 \times 10^{-3}$	$<2.74 \times 10^{-3}$	$<2.80 \times 10^{-3}$
mg/dscm @ 7% O_2	$<5.33 \times 10^{-3}$	$<5.84 \times 10^{-3}$	$<5.59 \times 10^{-3}$
lb/hr	$<4.50 \times 10^{-4}$	$<4.61 \times 10^{-4}$	$<4.56 \times 10^{-4}$
lb/1000 lb steam	$<7.64 \times 10^{-6}$	$<8.48 \times 10^{-6}$	$<8.06 \times 10^{-6}$

TABLE 4-2
METALS EMISSIONS RESULTS CONTINUED - UNIT 1

Run Number	**1**	**2**	**Average**
Zinc			
µg	22.1	22.9	22.5
mg/dscm	1.04×10^{-2}	1.02×10^{-2}	1.03×10^{-2}
mg/dscm @ 7% O_2	1.93×10^{-2}	2.18×10^{-2}	2.06×10^{-2}
lb/hr	1.63×10^{-3}	1.72×10^{-3}	1.68×10^{-3}
lb/1000 lb steam	2.77×10^{-5}	3.17×10^{-5}	2.97×10^{-5}

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.

Modified EPA Method 26A analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met.

EPA Method 29 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

The positive interference check for potassium failed high due to an ionization effect from the high concentration of multiple salts in the interference standard mix. All other quality control parameters passed for potassium.

The mercury on filter paper audit vial was received at the lab broken.

All other QA/QC criteria were met during this test program. See Section 4.1 regarding molybdenum analysis.

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

MONTROSE
AIR QUALITY SERVICES

EPA METHOD 1 FIELD DATA

Project Information

Client / Facility Covanta Marion

Date 12.6.2021

Source / Location Unit 1

Data taken by PB / SW

Circular/Elliptical Duct Measurements

	Port 1	Port 2	Port 3	Port 4
Far wall to outside of port distance, in.:	53.5	53.5		
Port length, in. (confirm flush with inside wall):	5.5	5.5		
Duct inner diameter, in.:	48.0	48.0		
Port diameter, in.:	4.0	4.0		
Upstream distance (A), in.:	1440.0			
Downstream distance (B), in.:	1200.0			
Number of ports (must be 90° to each other):	2			

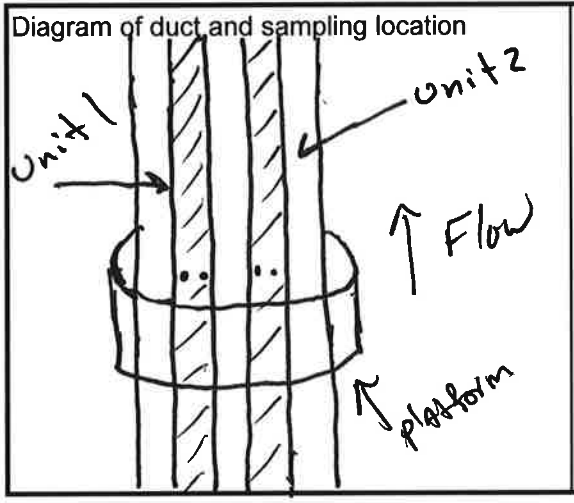
Duct Parameters

Material (steel, fiberglass, PVC)	Steel
Type of port (flange, npt nipple, etc.)	Nipple
Orientation (vertical, horizontal, if diagonal specify angle)	Vertical
Elevation of ports above ground, ft.	~140

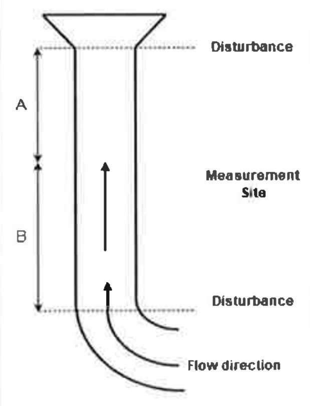
Cyclonic flow expected?	NO
Pitot ID	175-TP-6
Manometer ID	MB-30
Angle finder / protractor ID	700

Traverse point	Outside port distance, in.	Null angle, α
1	7.6	-3
2	12.5	-4
3	19.7	-2
4	39.3	-6
5	46.5	-8
6	51.4	-11
1	7.6	-1
2	12.5	0
3	19.7	-2
4	39.3	-4
5	46.5	-8
6	51.4	-13
Average of absolute α		

Diagram of duct and sampling location



Example:

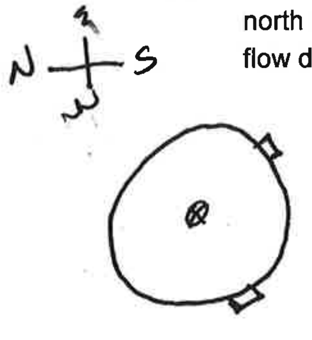


Cross-section sketch showing port locations and numbering

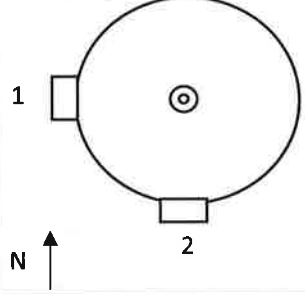
Label the following: port number 1, 2, etc.

north direction or other landmark

flow direction - ⊗ into page ⊙ out of page



Example:

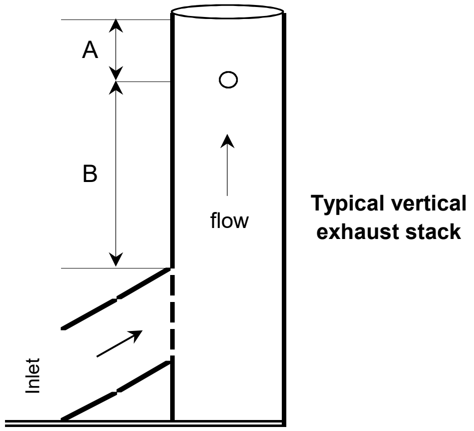


*For stacks having diameters greater than 24 in., no traverse points shall be within 1.00 in. of the stack walls; and for stack diameters equal to or less than 24 in., no traverse points shall be located within 0.50 in. - EPA Method 1 section 11.3.1 & 11.3.2

**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.

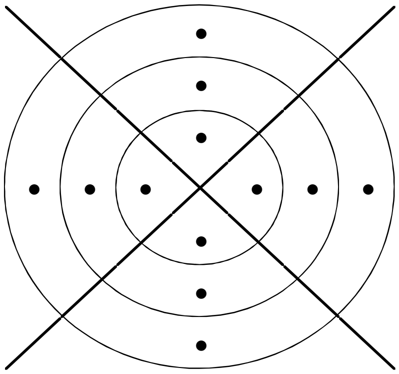
Covanta Marion / Unit 1 Stack
TRAVERSE POINT LAYOUT (PARTICULATE)
CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	**48.0**	***inches***
Upstream diameter (A):	**1440.0**	***inches***
Downstream diameter (B):	**1200.0**	***inches***
Port length:	**5.50**	***inches***
Number of ports being used:	**2**	***see note***
Equivalent upstream diameter (A):	**30.000**	***Pass***
Equivalent downstream diameter (B):	**25.000**	***Pass***
All points at least 1.0" from stack wall:	**2.112**	***Pass***
Total points:	**12**	
Points per port:	**6**	



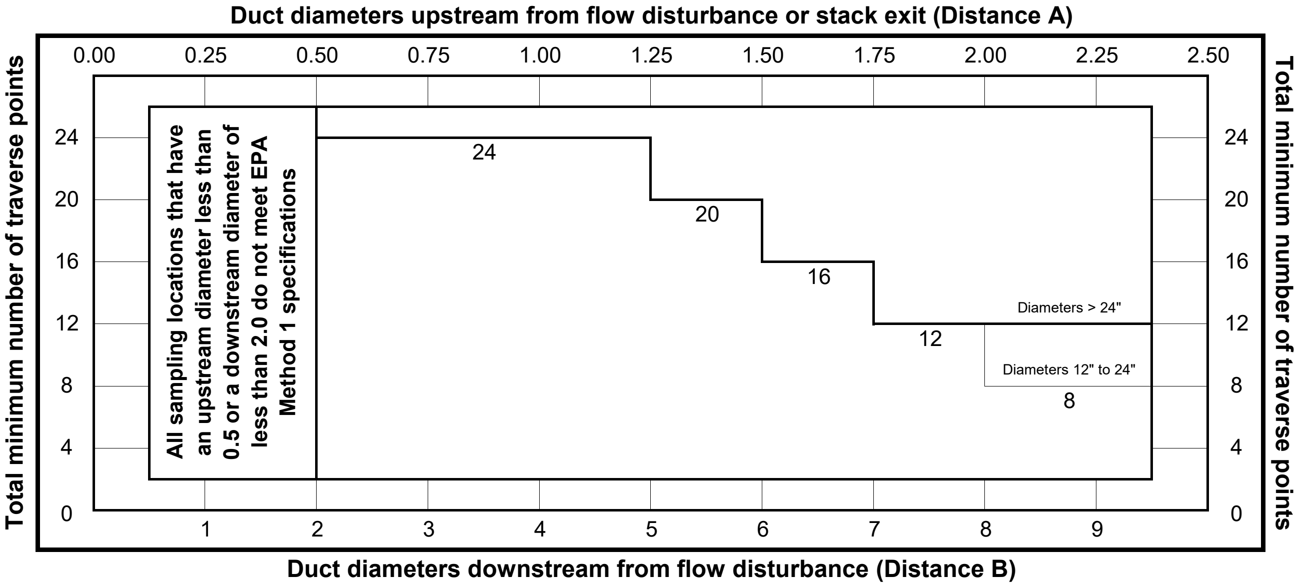
DUCT AREA = 12.566 ft^2

Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	4.4	2.1	7.6
2	14.6	7.0	12.5
3	29.6	14.2	19.7
4	70.4	33.8	39.3
5	85.4	41.0	46.5
6	95.6	45.9	51.4
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
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A



Example: Location of 12 points

Note: No traverse point shall be within 1.0" of the stack walls (see EPA 1 section 11.3.1). Points automatically adjusted to meet this criterion.



Appendix A.2
HCl & HF Data Sheets

MONTROSE
AIR QUALITY SERVICES

Acute
EPA Method 26A Field Datasheet (Isokinetic)

Page 1 of 1

Project Information
Date 12/7/21 Project # PROJ-010935
Customer/Facility Covanta
Unit ID/Sample Location #1 North
Run # 1 Operator AG

Sampling Conditions
Static Pressure, in. H_2O -0.78 Ambient Temp, °F 52
Barometric Pressure, in. Hg 29.72 Ref. Barometer ID NOAA
Wind Speed / Direction 7/5 Precipitation, Y [✓ N] type None
Probe / Filter Temp Range, °F 248-273

ALT 011 TC ID: Ambient °F Ref. °F
Stack
Probe See
Filter Box Final
Filter Exit Run
Meter outlet
Impinger Exit
Other
Ref. Thermometer ID 210187011
Continuity Check ☑ Continuity w/ Proper Polarity
Notes:

Sampling Equipment IDs
Meterbox ID MB33
Umbilical ID PDX-40-1
Nozzle ID —
Pitot / Probe ID 5-22
Manometer ID MB33
Sensitivity 0.01

Calibration
Meterbox Y 1.0236
Meterbox ΔH@, in. H_2O 1.6347
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	☑ @ 4	☐ ~~@~~	☑ @ 4
Pitot (-), pass @ in. H_2O	☑ @ 5	☐ ~~@~~	☑ @ 4
Pitot visual inspection	☑ pass	~~☐ pass~~	☑ pass
Nozzle visual inspection	☑ pass	~~☐ pass~~	☑ pass
Meter, cfm @ in. Hg	0.001 @ 13	~~@~~	0.001 @ 15
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		Stack Temp, °F	Probe Temp, °F	Filter Temp, °F		Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F			Pump Vacuum, in. Hg
					Target	Actual			Box	Exit		Inlet	Outlet		
1	0	1337	402.968	~~2.5~~ 1.5	1.6	1.6	223	250	249	250	60		71		3.0
2	5		407.12	~~2.7~~ 1.7			222	250	249	253	55		71		3.0
3	10		410.15	~~3.1~~ 1.9			221	250	251	255	54		71		3.0
4	15		413.80	1.8			220	249	247	253	55		71		3.0
5	20		417.35	1.6			222	251	251	256	56		71		3.0
6	25		421.03	1.2			219	250	249	253	58		72		3.0
1	30		424.75	1.6			223	249	250	255	60		73		3.0
2	35		428.61	1.7			223	249	250	257	60		75		3.0
3	40		431.84	2.1			222	250	249	255	61		74		3.0
4	45		435.58	1.8			220	251	251	257	62		75		30
5	50		439.01	1.5			218	250	250	254	62		75		3.0
6	55		442.78	0.93			216	250	250	255	63		76		3.0
	60	1437	446.256												
Averages															

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

001AS-QMS-FM-225

*AG

MONTROSE
AIR QUALITY SERVICES

Acute

EPA Method 26A Field Datasheet (Isokinetic)

Page 1 of 1

Project Information
Date 12/7/21 Project # PROJ - 010935
Customer/Facility Covanta
Unit ID/Sample Location #1 North
Run # 2 Operator AG

Sampling Conditions
Static Pressure, in. H_2O -0.80 Ambient Temp, °F 55
Barometric Pressure, in. Hg 29.92 Ref. Barometer ID NOAA
Wind Speed / Direction 5/S Precipitation, Y / [✓ N] type None
Probe / Filter Temp Range, °F 248 - 273

ALT 011

	TC ID:	Ambient °F	Ref. °F
Stack	5-22	66	66.4
Probe	5-22 See	66	66.4
Filter Box	524	Final 67	66.4
Filter Exit	6451	Run 67	66.4
Meter outlet	MB33	66	66.4
Impinger Exit	I44	66	66.4
Other			

Ref. Thermometer ID 210187011
Continuity Check ☑ Continuity w/ Proper Polarity
Notes:

Sampling Equipment IDs
Meterbox ID MB33
Umbilical ID PDX-40-1
Nozzle ID —
Pitot / Probe ID 5-22
Manometer ID MB33
Sensitivity 0.01

Calibration
Meterbox Y 1.0236
Meterbox ΔH@, in. H_2O 1.6347
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	☑ @ 4	~~☐ @~~	☑ @ 4
Pitot (-), pass @ in. H_2O	☑ @ 5	~~☐ @~~	☑ @ 4
Pitot visual inspection	☑ pass	~~☐ pass~~	☑ pass
Nozzle visual inspection	☑ pass	~~☐ pass~~	☑ pass
Meter, cfm @ in. Hg	0.001 @ 12	~~@~~	0.001 @ 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		Stack Temp, °F	Probe Temp, °F	Filter Temp, °F		Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F			Pump Vacuum, in. Hg
					Target	Actual			Box	Exit		Inlet	Outlet		
1	0	1605	446.961	1.8	1.6	1.6	230	250	250	249	63		76		3.0
2	5		451.07	2.1			230	250	250	252	62		77		3.0
3	10		454.07	2.0			230	250	250	254	61		77		3.0
4	15		457.68	1.8			231	251	250	253	56		78		3.0
5	20		461.34	1.9			228	250	250	253	58		79		3.0
6	25		464.93	1.2			226	250	249	256	58		80		3.0
1	30		468.73	1.8			230	249	250	257	56		80		3.0
2	35		472.19	2.0			231	250	250	255	55		82		3.0
3	40		475.82	2.2			231	250	250	253	55		82		3.0
4	45		479.46	2.1			231	250	251	253	56		83		3.0
5	50		483.09	1.6			231	250	250	255	56		84		3.0
6	55		486.73	1.1			227	250	250	257	57		84		3.0
	60	1705	490.372												
Averages															

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

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26A Acute

MONTROSE
AIR QUALITY SERVICES

Sample Recovery & Calibration Check Datasheet

Page 1 of 1

Project Information
Date 12/7/2021 Project # PROS-010935
Customer / Facility COVANTA
Unit ID / Sample Location Unit 1 26A Acute
Run # R1-3 EPA 26A Operator CC

Equipment Identification
Ref. Thermometer NOAA
Hygrometer /
Field Balance 23390312
Check Weights 10640
Calipers /

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

Date	12.7.21	12.8.2021	
Standard mass, g	500.0	500.0	
Field balance mass, g	499.9	499.9	

Ambient Conditions (Mobile Lab)
Relative humidity, %
Temperature, °F 68
Mobile lab # Sprinter

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										
Impinger 1	0.1 H_2SO_4	753.4	827.8	74.4	692.2	774.3	82.1	754.8		
Impinger 2	0.1 H_2SO_4	723.7	768.7	45.0	758.9	777.8	18.9	726.0		
Impinger 3	Empty	659.5	672.2	12.7	610.0	613.5	3.5	663.7		
Impinger 4										
Impinger 5										
Impinger 6										
Impinger 7										
Impinger 8										
Silica Gel	S.G	989.8	1001.5	11.7	932.7	939.4	6.7	1001.5		
Line Rinse										
Train Net Gain (Vlc)				143.8			111.2			

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

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 Number: Run 1: N/A Run 2: N/A Run 3: N/A Run :
Back Half: ☐ quartz fiber ☐ glass fiber ☐ Teflon ☐ Teflon/quartz ☐ other

Reagent Information

Type	Lot Number
0.1N H_2SO_4	60030
Type 1 H_2O	R000591

Sample Observations

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

Checked by: PB Team Leader: PB

001AS-QMS-FM-226

Appendix A.3
Multi Metals Data Sheets

MONTROSE AIR QUALITY SERVICES

Acute

EPA Method 29 Field Datasheet (Isokinetic)

Page 1 of 1

Project Information

Date 12/7/21 Project # PROJ-010935

Customer/Facility Covanta

Unit ID/Sample Location 1 North

Run # 1 Operator PB

Sampling Conditions

Static Pressure, in. H_2O -.84

Ambient Temp, °F 55

Barometric Pressure, in. Hg 29.72

Ref. Barometer ID NOAA

Wind Speed / Direction 7/S

Precipitation [✓ Y]/N, type Rain

Probe / Filter Temp Range, °F 248 ± 25

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack	6-6	66	66.4
Probe	6-6	66	66.4
Filter Box	PDX-05-2		
Filter Exit	—	—	—
Meter outlet	MB30		
Impinger Exit	1-35		
Other			

Ref. Thermometer ID 220187011

Continuity Check ☑ Continuity w/ Proper Polarity

Notes:

Sampling Equipment IDs

Meterbox ID MB30

Umbilical ID PDX-60

Nozzle ID 6-926

Pitot / Probe ID 6-6

Manometer ID MB30

Sensitivity .01

Calibration

Meterbox Y .9954

Meterbox ΔH@, in. H_2O 1.7577

Nozzle diameter, Dn, in. .187

Pitot coefficient, Cp .84

Manometer zero and level ☑ yes

K-Factor .75

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 6	~~☐ @~~	☑ @ 5
Pitot (-), pass @ in. H_2O	☑ @ 4	~~☐ @~~	☑ @ 5
Pitot visual inspection	☑ pass	~~☐ pass~~	☑ pass
Nozzle visual inspection	☑ pass	~~☐ pass~~	☑ pass
Meter, cfm @ in. Hg	.001 @ 12	~~@~~	.001 @ 15
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		Stack Temp, °F	Probe Temp, °F	Filter Temp, °F		Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F			Pump Vacuum, in. Hg
					Target	Actual			Box	Exit		Inlet	Outlet		
1	0	1337	569.530	1.5	1.12	1.1	220	257	255		55		60		2
2	10		575.32	1.7	1.27	1.3	221	260	231		56		60		2
3	20		582.24	2.0	1.5	1.5	221	259	258		56		60		2
4	30		588.53	1.8	1.35	1.4	221	256	260		58		60		2
5	40		595.18	1.6	1.2	1.2	219	[illegible] 255	258		57		62		2
6	50		601.22	.88	.60	.66	215	257	258		57		62		2
1	60	~~1437~~ 1445	605.638	1.0	.75	.75	217	258	257		57		62		2
2	70		610.64	2.0	1.5	1.5	222	258	255		57		62		2
3	80		617.35	2.2	1.65	1.7	230	259	255		59		63		2
4	90		624.57	2.2	1.65	1.7	229	259	257		60		~~60~~ 65		2
5	100		631.71	2.0	1.5	1.5	229	259	257		64		68		2
6	110		639.16	1.6	1.2	1.2	228	257	256		65		72		2
Final	120	1545	644.762												
Averages															

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

001AS-QMS-FM-225

Acute

MONTROSE AIR QUALITY SERVICES

EPA Method 29 Field Datasheet (Isokinetic)

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Project Information

Date 12/7/21 Project # PROJ-010691
Customer/Facility Covanta
Unit ID/Sample Location 1 North
Run # 2 Operator PB

Sampling Conditions

Static Pressure, in. H_2O -.82
Ambient Temp, °F 54
Barometric Pressure, in. Hg 29.72
Ref. Barometer ID NOAA
Wind Speed / Direction 5/5
Precipitation [✓ Y]/N, type Rain
Probe / Filter Temp Range, °F 248 ± 25

ALT 011	TC ID:	Ambient °F	Ref. °F
Stack	6-8	67	66.4
Probe	6-8	67	66.4
Filter Box	TDX-05-7	67	66.4
Filter Exit	—	—	—
Meter outlet	MB30	67	66.4
Impinger Exit	I-35	66	66.4
Other			

Ref. Thermometer ID 210187011
Continuity Check ☑ Continuity w/ Proper Polarity
Notes:

Sampling Equipment IDs

Meterbox ID MB30
Umbilical ID FDX-60
Nozzle ID 6-925
Pitot / Probe ID 6-8
Manometer ID MB30
Sensitivity .01

Calibration

Meterbox Y .9854
Meterbox ΔH@, in. H_2O 1.7577
Nozzle diameter, Dn, in. .186
Pitot coefficient, Cp .84
Manometer zero and level ☑ yes
K-Factor .75

Equipment Checks	Pre	Mid	Post
Pitot (+), pass @ in. H_2O	☑ @ 4	~~☐ @~~	☑ @ 5
Pitot (-), pass @ in. H_2O	☑ @ 4.5	~~☐ @~~	☑ @ 5
Pitot visual inspection	☐ pass	~~☐ pass~~	☐ pass
Nozzle visual inspection	☑ pass	~~☐ pass~~	☑ pass
Meter, cfm @ in. Hg	.001 @ 10	~~@~~	.001 @ 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		Stack Temp, °F	Probe Temp, °F	Filter Temp, °F		Impinger Exit Temp, °F	Dry Gas Meter Temperature, °F			Pump Vacuum, in. Hg
					Target	Actual			Box	Exit		Inlet	Outlet		
1	0	1605	645.044	1.9	1.43	1.4	229	234	258		59		75		2
2	10		651.94	2.0	1.5	1.5	231	226	259		59		75		2
3	20		659.60	2.2	~~[illegible]~~ 1.65	1.7	231	244	250		60		75		2
4	30		666.06	2.0	1.5	1.5	231	229	253		59		75		2
5	40		673.37	1.5	1.12	1.1	229	240	256		58		75		2
6	50		678.87	1.2	.90	.90	227	235	256		58		76		2
1	60	1705	684.362	1.3	.975	.98	230	246	253		59		76		2
2	70	~~[illegible]~~ 1712	690.56	1.7	1.27	1.3	229	240	252		57		74		2
3	80		696.69	2.0	1.5	1.5	235	228	254		57		71		2
4	90		704.28	2.4	1.8	1.8	235	236	254		58		69		2
5	100		711.77	2.4	1.8	1.8	235	240	255		58		67		2
6	110		718.44	2.0	1.5	1.5	235	242	253		58		67		2
	120	1812	725.257								58				2
Averages															

QA/QC Check: Completeness ✓ Legibility ✓ Accuracy ✓ Specifications ✓ Checked By PB Team Leader PB method 29

MONTROSE AIR QUALITY SERVICES

Sample Recovery & Calibration Check Datasheet

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Project Information

Date 12-7-2021 Project # PR05-010935

Customer / Facility Covanta Marion

Unit ID / Sample Location Unit 1 ([illegible]) Acute

Run # 1-3 Operator PB

Equipment Identification

Ref. Thermometer NOAA

Hygrometer \

Field Balance 12008138

Check Weights 10640

Calipers 0093615

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

Date	12.7.2021	12.8.21	
Standard mass, g	500.0	500.0	
Field balance mass, g	500.0	500.0	

Ambient Conditions (Mobile Lab)

Relative humidity, % \

Temperature, °F 68

Mobile lab # TV-4

8

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										
Impinger 1	5%/10%	752.8	933.6	180.8	750.0	883.4	133.4	751.8		
Impinger 2	5%/10%	711.2	765.0	53.8	743.7	793.3	49.6	707.2		
Impinger 3	empty	640.4	650.0	9.6	642.1	650.5	8.4	607.1		
Impinger 4	KMnO4	756.0	759.6	3.6	604.5	620.1	15.6	759.0		
Impinger 5	KMnO4	753.30	755.2	1.9	769.3	772.3	3.0	739.51		
Impinger 6										
Impinger 7										
Impinger 8										
Silica Gel	Silica	948.2	957.6	9.4	896.4	909.0	12.6	913.4		
Line Rinse										
Train Net Gain (Vlc)				259.1			222.6			

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

Nozzle 1 diameters 0.187 D1 0.187 D2 0.186 D3 0.~~186~~ Average 0.187

Nozzle 2 diameters 0.186 D1 0.187 D2 0.186 D3 0.186 Average

Nozzle 3 diameters D1 D2 D3 Average

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 Number: Run 1: N/A Run 2: N/A Run 3: N/A Run :

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

Reagent Information

Type	Lot Number
DI	KBP101
5% HNO_3 / 10% H_2O_2	61160/S110003
10% H_2SO_4	S21287
$KMnO_4$	Lot 201216-2E
0.1N HNO_3	421113
8N HCl	S21288

Sample Observations

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

Checked by: PB Team Leader: PB

001AS-QMS-FM-226

Appendix A.4
Instrumental Test Method Data

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Analyzer Configuration

Name:	O2-695	CO2-741						
Make/Model:								
25A or 7E:	7E	7E						
Voltage max:	10	10						
Voltage offset:	0	0						
Range:	10	10						
Upscale:								
Downscale:								

Cylinder Information

Zero Number:	CC733388	CC733388						
Zero Conc:	0	0						
Low Number:								
Low Conc:								
Mid Number:	EB0063296	EB0063296						
Mid Conc:	10.19	9.923						
High Number:	EB0089025	EB0089025						
High Conc:	23.04	22.66						
Bias Number:	EB0063296	EB0063296						
Bias Conc:	10.19	9.923						

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Calibration

	Name:	O2-695	CO2-741						
	Make/Model:								
	25A or 7E:	7E	7E						

Cylinder Concentrations

	Zero:	0.000	0.000						
	Low:								
	Mid:	10.19	9.923						
	High:	23.04	22.66						

Calibration Readings

	Zero reading:	0.011	-0.059						
	Low reading:	0.000	0.000						
	Mid reading:	10.22	9.857						
	High reading:	23.05	22.64						

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.048	-0.260						
Mid %Err:	**<2.0**	0.130	-0.291						
High %Err:	**<2.0**	0.043	-0.088						

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Initial bias

	Name:	O2-695	CO2-741						
	Make/Model:								
	25A or 7E:	7E	7E						

Cylinder Concentrations

	Zero:	0.000	0.000						
	Low:								
	Mid:	10.19	9.923						
	High:	23.04	22.66						

Calibration Readings

	Zero reading:	0.011	-0.059						
	Low reading:	0.000	0.000						
	Mid reading:	10.22	9.857						
	High reading:	23.05	22.64						

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.048	-0.260						
Mid %Err:	**<2.0**	0.130	-0.291						
High %Err:	**<2.0**	0.043	-0.088						

Initial Bias Data

	Zero reading:	0.070	0.232						
	Span reading:	10.09	9.841						
Zero % bias:	**<5.0**	0.256	1.284						
Span % bias:	**<5.0**	-0.564	-0.071						

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	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 - Unit 1 Acute

13:37:00 - 15:37:00

	Name:	O2-695	CO2-741						
	Make/Model:								
Dec 7 2021	13:38:00	13.10	6.341						
Dec 7 2021	13:39:00	13.13	6.302						
Dec 7 2021	13:40:00	13.00	6.422						
Dec 7 2021	13:41:00	13.05	6.402						
Dec 7 2021	13:42:00	13.16	6.302						
Dec 7 2021	13:43:00	13.36	6.149						
Dec 7 2021	13:44:00	13.26	6.224						
Dec 7 2021	13:45:00	13.03	6.406						
Dec 7 2021	13:46:00	12.86	6.523						
Dec 7 2021	13:47:00	12.89	6.501						
Dec 7 2021	13:48:00	12.76	6.601						
Dec 7 2021	13:49:00	12.98	6.400						
Dec 7 2021	13:50:00	12.90	6.475						
Dec 7 2021	13:51:00	12.85	6.511						
Dec 7 2021	13:52:00	13.02	6.379						
Dec 7 2021	13:53:00	13.14	6.276						
Dec 7 2021	13:54:00	12.88	6.511						
Dec 7 2021	13:55:00	13.21	6.225						
Dec 7 2021	13:56:00	13.11	6.305						
Dec 7 2021	13:57:00	12.86	6.509						
Dec 7 2021	13:58:00	13.08	6.318						
Dec 7 2021	13:59:00	12.97	6.426						
Dec 7 2021	14:00:00	12.80	6.588						
Dec 7 2021	14:01:00	12.84	6.541						
Dec 7 2021	14:02:00	12.96	6.426						
Dec 7 2021	14:03:00	12.91	6.469						
Dec 7 2021	14:04:00	12.80	6.582						
Dec 7 2021	14:05:00	12.99	6.421						
Dec 7 2021	14:06:00	13.24	6.238						
Dec 7 2021	14:07:00	12.79	6.600						
Dec 7 2021	14:08:00	12.74	6.606						
Dec 7 2021	14:09:00	12.69	6.685						
Dec 7 2021	14:10:00	13.00	6.375						
Dec 7 2021	14:11:00	13.12	6.298						
Dec 7 2021	14:12:00	12.99	6.446						
Dec 7 2021	14:13:00	13.00	6.421						
Dec 7 2021	14:14:00	12.99	6.433						
Dec 7 2021	14:15:00	13.22	6.248						
Dec 7 2021	14:16:00	12.98	6.428						
Dec 7 2021	14:17:00	13.16	6.270						
End of port 1 point 1									
Dec 7 2021	14:18:00	13.20	6.256						
Dec 7 2021	14:19:00	12.88	6.525						
Dec 7 2021	14:20:00	13.07	6.369						
Dec 7 2021	14:21:00	12.97	6.453						
Dec 7 2021	14:22:00	12.99	6.425						
Dec 7 2021	14:23:00	13.01	6.393						

Dec 7 2021	14:24:00	13.00	6.412						
Dec 7 2021	14:25:00	13.06	6.352						
Dec 7 2021	14:26:00	13.19	6.252						
Dec 7 2021	14:27:00	12.96	6.452						
Dec 7 2021	14:28:00	12.86	6.517						
Dec 7 2021	14:29:00	13.15	6.277						
Dec 7 2021	14:30:00	12.78	6.583						
Dec 7 2021	14:31:00	12.82	6.515						
Dec 7 2021	14:32:00	13.01	6.374						
Dec 7 2021	14:33:00	12.74	6.595						
Dec 7 2021	14:34:00	13.26	6.189						
Dec 7 2021	14:35:00	13.12	6.302						
Dec 7 2021	14:36:00	13.29	6.160						
Dec 7 2021	14:37:00	13.19	6.267						
Dec 7 2021	14:38:00	13.09	6.338						
Dec 7 2021	14:39:00	13.09	6.339						
Dec 7 2021	14:40:00	13.31	6.178						
Dec 7 2021	14:41:00	13.18	6.279						
Dec 7 2021	14:42:00	13.22	6.257						
Dec 7 2021	14:43:00	13.01	6.435						
Dec 7 2021	14:44:00	13.25	6.234						
Dec 7 2021	14:45:00	13.07	6.387						
Dec 7 2021	14:46:00	13.23	6.230						
Dec 7 2021	14:47:00	13.31	6.190						
Dec 7 2021	14:48:00	13.57	5.981						
Dec 7 2021	14:49:00	13.58	5.941						
Dec 7 2021	14:50:00	13.78	5.817						
Dec 7 2021	14:51:00	14.14	5.507						
Dec 7 2021	14:52:00	14.18	5.483						
Dec 7 2021	14:53:00	13.95	5.661						
Dec 7 2021	14:54:00	13.89	5.700						
Dec 7 2021	14:55:00	13.67	5.872						
Dec 7 2021	14:56:00	13.62	5.895						
Dec 7 2021	14:57:00	13.58	5.945						
End of port 1 point 2									
Dec 7 2021	14:58:00	14.00	5.612						
Dec 7 2021	14:59:00	13.80	5.792						
Dec 7 2021	15:00:00	13.53	6.007						
Dec 7 2021	15:01:00	13.14	6.314						
Dec 7 2021	15:02:00	13.00	6.439						
Dec 7 2021	15:03:00	12.98	6.459						
Dec 7 2021	15:04:00	12.48	6.863						
Dec 7 2021	15:05:00	12.25	7.027						
Dec 7 2021	15:06:00	12.21	7.045						
Dec 7 2021	15:07:00	12.28	6.990						
Dec 7 2021	15:08:00	12.45	6.842						
Dec 7 2021	15:09:00	12.38	6.893						
Dec 7 2021	15:10:00	12.52	6.774						
Dec 7 2021	15:11:00	12.54	6.791						
Dec 7 2021	15:12:00	12.83	6.563						
Dec 7 2021	15:13:00	13.74	5.816						
Dec 7 2021	15:14:00	14.35	5.318						

Dec 7 2021	15:15:00	14.64	5.084						
Dec 7 2021	15:16:00	14.67	5.059						
Dec 7 2021	15:17:00	14.37	5.308						
Dec 7 2021	15:18:00	13.87	5.729						
Dec 7 2021	15:19:00	13.27	6.239						
Dec 7 2021	15:20:00	12.86	6.582						
Dec 7 2021	15:21:00	12.54	6.811						
Dec 7 2021	15:22:00	12.98	6.447						
Dec 7 2021	15:23:00	13.20	6.258						
Dec 7 2021	15:24:00	13.61	5.918						
Dec 7 2021	15:25:00	14.58	5.155						
Dec 7 2021	15:26:00	14.71	5.052						
Dec 7 2021	15:27:00	14.28	5.424						
Dec 7 2021	15:28:00	13.78	5.828						
Dec 7 2021	15:29:00	13.15	6.331						
Dec 7 2021	15:30:00	12.76	6.612						
Dec 7 2021	15:31:00	12.89	6.484						
Dec 7 2021	15:32:00	13.21	6.233						
Dec 7 2021	15:33:00	13.56	5.941						
Dec 7 2021	15:34:00	13.80	5.743						
Dec 7 2021	15:35:00	14.00	5.577						
Dec 7 2021	15:36:00	13.97	5.595						
Dec 7 2021	15:37:00	14.06	5.516						
End of port 1 point 3									

	Average:	13.21	6.245						
	Max:	14.71	7.045						
	Min:	12.21	5.052						

Stratification Results

Port	**Point**	O2-695	CO2-741						
1	1	12.99	6.419						
1	2	13.25	6.222						
1	3	13.38	6.119						
	Strat diff:	0.173	0.166						
	Strat %:	1.641	2.649						

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	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 - Unit 1 Acute

13:37:00 - 15:37:00

	Name:	O2-695	CO2-741						
	Make/Model:								
	25A or 7E:	7E	7E						

Run summary data

	Raw Avg:	13.21	6.245						
	Max:	14.71	7.045						
	Min:	12.21	5.052						

Cylinder Concentrations

	Zero:	0.000	0.000						
	Low:								
	Mid:	10.19	9.923						
	High:	23.04	22.66						

Calibration Readings

	Zero reading:	0.011	-0.059						
	Low reading:								
	Mid reading:	10.22	9.857						
	High reading:	23.05	22.64						

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.048	-0.260						
Mid %Err:	**<2.0**	0.130	-0.291						
High %Err:	**<2.0**	0.043	-0.088						

Initial Bias Data

	Zero reading:	0.070	0.232						
	Span reading:	10.09	9.841						
Zero % bias:	**<5.0**	0.256	1.284						
Span % bias:	**<5.0**	-0.564	-0.071						

Final Bias Data

	Zero reading:	0.005	0.150						
	Span reading:	9.979	9.673						
Zero % bias:	**<5.0**	-0.026	0.922						
Span % bias:	**<5.0**	-1.046	-0.812						
Zero % drift:	**<3.0**	0.282	0.362						
Span % drift:	**<3.0**	0.482	0.741						

Bias Corrected Averages

	Cor Avg:	13.43	6.280						

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	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 - Run 2 Acute Unit 1

16:06:00 - 18:06:00

	Name:	O2-695	CO2-741						
	Make/Model:								
Dec 7 2021	16:07:00	13.55	5.868						
Dec 7 2021	16:08:00	13.56	5.874						
Dec 7 2021	16:09:00	13.76	5.711						
Dec 7 2021	16:10:00	14.12	5.419						
Dec 7 2021	16:11:00	14.10	5.452						
Dec 7 2021	16:12:00	13.92	5.581						
Dec 7 2021	16:13:00	14.15	5.415						
Dec 7 2021	16:14:00	13.87	5.639						
Dec 7 2021	16:15:00	13.47	5.968						
Dec 7 2021	16:16:00	13.73	5.763						
Dec 7 2021	16:17:00	14.03	5.527						
Dec 7 2021	16:18:00	14.21	5.372						
Dec 7 2021	16:19:00	13.68	5.798						
Dec 7 2021	16:20:00	13.84	5.663						
Dec 7 2021	16:21:00	13.74	5.735						
Dec 7 2021	16:22:00	14.08	5.475						
Dec 7 2021	16:23:00	14.35	5.233						
Dec 7 2021	16:24:00	14.40	5.198						
Dec 7 2021	16:25:00	13.53	5.886						
Dec 7 2021	16:26:00	14.00	5.525						
Dec 7 2021	16:27:00	14.19	5.368						
Dec 7 2021	16:28:00	13.71	5.738						
Dec 7 2021	16:29:00	13.81	5.684						
Dec 7 2021	16:30:00	14.13	5.437						
Dec 7 2021	16:31:00	14.58	5.039						
Dec 7 2021	16:32:00	14.53	5.117						
Dec 7 2021	16:33:00	13.81	5.694						
Dec 7 2021	16:34:00	13.58	5.873						
Dec 7 2021	16:35:00	13.97	5.537						
Dec 7 2021	16:36:00	14.35	5.245						
Dec 7 2021	16:37:00	14.30	5.288						
Dec 7 2021	16:38:00	14.32	5.266						
Dec 7 2021	16:39:00	13.85	5.650						
Dec 7 2021	16:40:00	13.87	5.642						
Dec 7 2021	16:41:00	14.24	5.351						
Dec 7 2021	16:42:00	14.20	5.385						
Dec 7 2021	16:43:00	14.27	5.344						
Dec 7 2021	16:44:00	13.62	5.849						
Dec 7 2021	16:45:00	13.77	5.735						
Dec 7 2021	16:46:00	14.13	5.409						
End of port 1 point 1									
Dec 7 2021	16:47:00	14.01	5.535						
Dec 7 2021	16:48:00	14.06	5.481						
Dec 7 2021	16:49:00	14.24	5.309						
Dec 7 2021	16:50:00	14.18	5.407						
Dec 7 2021	16:51:00	13.88	5.617						
Dec 7 2021	16:52:00	14.28	5.297						

Dec 7 2021	16:53:00	14.48	5.143						
Dec 7 2021	16:54:00	14.34	5.245						
Dec 7 2021	16:55:00	14.06	5.491						
Dec 7 2021	16:56:00	14.27	5.315						
Dec 7 2021	16:57:00	14.14	5.423						
Dec 7 2021	16:58:00	14.01	5.523						
Dec 7 2021	16:59:00	13.99	5.527						
Dec 7 2021	17:00:00	13.86	5.637						
Dec 7 2021	17:01:00	13.83	5.658						
Dec 7 2021	17:02:00	13.67	5.776						
Dec 7 2021	17:03:00	13.64	5.778						
Dec 7 2021	17:04:00	14.06	5.428						
Dec 7 2021	17:05:00	14.34	5.229						
Dec 7 2021	17:06:00	13.85	5.634						
Dec 7 2021	17:07:00	14.09	5.429						
Dec 7 2021	17:08:00	13.91	5.565						
Dec 7 2021	17:09:00	13.76	5.684						
Dec 7 2021	17:10:00	13.48	5.927						
Dec 7 2021	17:11:00	13.61	5.793						
Dec 7 2021	17:12:00	14.01	5.482						
Dec 7 2021	17:13:00	14.37	5.180						
Dec 7 2021	17:14:00	14.08	5.428						
Dec 7 2021	17:15:00	13.99	5.499						
Dec 7 2021	17:16:00	14.09	5.412						
Dec 7 2021	17:17:00	14.02	5.470						
Dec 7 2021	17:18:00	13.81	5.624						
Dec 7 2021	17:19:00	14.00	5.480						
Dec 7 2021	17:20:00	13.96	5.518						
Dec 7 2021	17:21:00	13.83	5.618						
Dec 7 2021	17:22:00	14.02	5.495						
Dec 7 2021	17:23:00	14.04	5.463						
Dec 7 2021	17:24:00	14.01	5.447						
Dec 7 2021	17:25:00	14.23	5.270						
Dec 7 2021	17:26:00	14.40	5.139						
End of port 1 point 2									
Dec 7 2021	17:27:00	14.41	5.133						
Dec 7 2021	17:28:00	14.20	5.324						
Dec 7 2021	17:29:00	14.32	5.226						
Dec 7 2021	17:30:00	13.94	5.527						
Dec 7 2021	17:31:00	13.94	5.509						
Dec 7 2021	17:32:00	14.15	5.322						
Dec 7 2021	17:33:00	14.48	5.067						
Dec 7 2021	17:34:00	14.49	5.063						
Dec 7 2021	17:35:00	14.23	5.274						
Dec 7 2021	17:36:00	14.12	5.355						
Dec 7 2021	17:37:00	14.05	5.421						
Dec 7 2021	17:38:00	13.87	5.570						
Dec 7 2021	17:39:00	14.01	5.442						
Dec 7 2021	17:40:00	14.21	5.281						
Dec 7 2021	17:41:00	14.32	5.199						
Dec 7 2021	17:42:00	14.21	5.280						
Dec 7 2021	17:43:00	13.86	5.556						

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: True	Ports: 1	Points per port: 3	DAQ Device: DT9806(00)

Dec 7 2021	17:44:00	14.03	5.409						
Dec 7 2021	17:45:00	14.52	5.019						
Dec 7 2021	17:46:00	14.70	4.882						
Dec 7 2021	17:47:00	14.49	5.064						
Dec 7 2021	17:48:00	14.44	5.095						
Dec 7 2021	17:49:00	14.28	5.235						
Dec 7 2021	17:50:00	14.07	5.403						
Dec 7 2021	17:51:00	14.49	5.080						
Dec 7 2021	17:52:00	14.14	5.361						
Dec 7 2021	17:53:00	14.06	5.408						
Dec 7 2021	17:54:00	14.26	5.224						
Dec 7 2021	17:55:00	14.47	5.063						
Dec 7 2021	17:56:00	14.26	5.240						
Dec 7 2021	17:57:00	14.28	5.230						
Dec 7 2021	17:58:00	14.74	4.855						
Dec 7 2021	17:59:00	14.82	4.794						
Dec 7 2021	18:00:00	14.56	5.032						
Dec 7 2021	18:01:00	14.33	5.216						
Dec 7 2021	18:02:00	14.33	5.205						
Dec 7 2021	18:03:00	14.26	5.275						
Dec 7 2021	18:04:00	14.40	5.143						
Dec 7 2021	18:05:00	14.49	5.091						
Dec 7 2021	18:06:00	14.39	5.143						
End of port 1 point 3									

	Average:	14.10	5.418						
	Max:	14.82	5.968						
	Min:	13.47	4.794						

Stratification Results

Port	**Point**	O2-695	CO2-741						
1	1	14.00	5.534						
1	2	14.01	5.491						
1	3	14.27	5.238						
	Strat diff:	0.177	0.113						
	Strat %:	1.254	3.376						

MONTROSE
ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Covanta Marion	Project Number: PROJ-010935	CEMS Operator: PB	Unit/Condition: Unit 1
Run Length: 120	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 - Run 2 Acute Unit 1

16:06:00 - 18:06:00

	Name:	O2-695	CO2-741						
	Make/Model:								
	25A or 7E:	7E	7E						

Run summary data

	Raw Avg:	14.10	5.418						
	Max:	14.82	5.968						
	Min:	13.47	4.794						

Cylinder Concentrations

	Zero:	0.000	0.000						
	Low:								
	Mid:	10.19	9.923						
	High:	23.04	22.66						

Calibration Readings

	Zero reading:	0.011	-0.059						
	Low reading:								
	Mid reading:	10.22	9.857						
	High reading:	23.05	22.64						

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.048	-0.260						
Mid %Err:	**<2.0**	0.130	-0.291						
High %Err:	**<2.0**	0.043	-0.088						

Initial Bias Data

	Zero reading:	0.005	0.150						
	Span reading:	9.979	9.673						
Zero % bias:	**<5.0**	-0.026	0.922						
Span % bias:	**<5.0**	-1.046	-0.812						

Final Bias Data

	Zero reading:	0.067	0.234						
	Span reading:	10.02	9.754						
Zero % bias:	**<5.0**	0.243	1.293						
Span % bias:	**<5.0**	-0.868	-0.455						
Zero % drift:	**<3.0**	0.269	0.371						
Span % drift:	**<3.0**	0.178	0.357						

Bias Corrected Averages

	Cor Avg:	14.38	5.446						

Appendix A.5
HCl & HF Calculations/Results

SOURCE TEST DATA SUMMARY

Hydrogen Chloride by EPA Method 26A

Client			Covanta - Marion
Unit / Location			Unit 1 (North)
A (stack area), ft^2			12.566
T_{ref} (reference temperature), °F			68
Steam Production, Mlb/hr	61.0	55.3	
Test number	1-26A	2-26A	Average
Date	12/7/2021	12/7/2021	--
Start / Stop time	1337-1437	1605-1705	--
Meter box number	MB33	MB33	--
C_p (pitot coefficient), dimensionless	0.84	0.84	0.84
Y (meter calibration factor), dimensionless	1.0236	1.0236	1.0236
Θ (sample time), min	60	60	60
P_{bar} (barometric pressure), in Hg	29.72	29.72	29.72
V_m (meter box volume), acf	43.288	43.411	43.350
V_{lc} (impinger liquid), gm	143.8	111.2	127.5
T_m (meter temperature), °F	72.9	80.1	76.5
ΔH (meter pressure), in. H_2O	1.600	1.600	1.600
ΔP (velocity head), in. H_2O	1.5955	1.7828	1.6891
P_g (static pressure), in. H_2O	-0.78	-0.80	-0.79
T_s (stack temperature), °F	220.8	229.7	225.2
$\%O_2$ (oxygen stack gas), % volume dry	13.43	14.38	13.91
$\%CO_2$ (carbon dioxide stack gas), % volume dry	6.28	5.45	5.86
LAB RESULTS			
Impingers 1 & 2 (Sulfuric Acid Absorbing Solution)			
m_{12} (mass of HCl), µg	6,502	10,615	8,559
$V_{s,12}$ (Sample volume) ml	420	430	--
1a $V_{m(std)}$ (standard sample volume), dscf	43.780	43.322	43.551
1b $V_{w(std)}$ (water vapor volume), scf	6.780	5.243	6.012
1c B_{ws} (moisture fraction), non-dimensional	0.1341	0.1080	0.1210
B_{ws} (moisture fraction saturated), non-dimensional	NA	NA	NA
B_{ws} (moisture fraction applicable), non-dimensional	0.1341	0.1080	0.1210
1d M_d (stack gas molecular weight), dry	29.542	29.447	29.494
1e M_s (stack gas molecular weight), wet	27.994	28.211	28.102
1f P_s (absolute stack pressure), in Hg	29.663	29.661	29.662
1g V_s (stack gas velocity), ft/sec	82.130	87.048	84.589
1h Q (stack flow rate), acf/min	61,924	65,633	63,778
1i Q_{sw} (stack flow rate), wscf/min	47,616	49,813	48,715
1j Q_{sd} (stack flow rate), dscf/min	41,231	44,435	42,833
Hydrogen Chloride (HCl) Emissions			
mg/sample as HCl	6.50	10.6	8.56
mg/dscm as HCl	5.24	8.65	6.95
ppmvd as HCl	3.46	5.70	4.58
ppmvd @ 7% O_2 as HCl	6.43	12.2	9.30
lb/hr as HCl	0.809	1.44	1.12
lb/1000 lb steam as HCl	0.0133	0.0260	0.0196

SOURCE TEST DATA SUMMARY

Hydrogen Fluoride by EPA Method 26A

	Client			Covanta - Marion
	Unit / Location			Unit 1 (North)
	A (stack area), ft^2			12.566
	T_{ref} (reference temperature), °F			68
	Steam Production, Mlb/hr	61.0	55.3	

	Test number	1-26A	2-26A	Average
	Date	12/7/2021	12/7/2021	--
	Start / Stop time	1337-1437	1605-1705	--
	Meter box number	MB33	MB33	--
	C_p (pitot coefficient), dimensionless	0.84	0.84	0.84
	Y (meter calibration factor), dimensionless	1.0236	1.0236	1.0236
	Θ (sample time), min	60	60	60
	P_{bar} (barometric pressure), in Hg	29.72	29.72	29.72
	V_m (meter box volume), acf	43.288	43.411	43.350
	V_{lc} (impinger liquid), gm	143.8	111.2	127.5
	T_m (meter temperature), °F	72.9	80.1	76.5
	ΔH (meter pressure), in. H_2O	1.600	1.600	1.600
	ΔP (velocity head), in. H_2O	1.5955	1.7828	1.6891
	P_g (static pressure), in. H_2O	-0.78	-0.80	-0.79
	T_s (stack temperature), °F	220.8	229.7	225.2
	$\%O_2$ (oxygen stack gas), % volume dry	13.43	14.38	13.91
	$\%CO_2$ (carbon dioxide stack gas), % volume dry	6.28	5.446	5.86

LAB RESULTS

Impingers 1 & 2 (Sulfuric Acid Absorbing Solution)

	m_{12} (mass of HF), µg	<22.1	<22.6	<22.4
	$V_{s,12}$ (Sample volume) ml	420	430	--
1a	$V_{m(std)}$ (standard sample volume), dscf	43.780	43.322	43.551
1b	$V_{w(std)}$ (water vapor volume), scf	6.780	5.243	6.012
1c	B_{ws} (moisture fraction), non-dimensional	0.1341	0.1080	0.1210
	B_{ws} (moisture fraction saturated), non-dimensional	NA	NA	NA
	B_{ws} (moisture fraction applicable), non-dimensional	0.1341	0.1080	0.1210
1d	M_d (stack gas molecular weight), dry	29.542	29.447	29.494
1e	M_s (stack gas molecular weight), wet	27.994	28.211	28.102
1f	P_s (absolute stack pressure), in Hg	29.663	29.661	29.662
1g	V_s (stack gas velocity), ft/sec	82.130	87.048	84.589
1h	Q (stack flow rate), acf/min	61,924	65,633	63,778
1i	Q_{sw} (stack flow rate), wscf/min	47,616	49,813	48,715
1j	Q_{sd} (stack flow rate), dscf/min	41,231	44,435	42,833

Hydrogen Fluoride (HF) Emissions

mg/sample as HF	<0.0221	<0.0226	<0.0224
mg/dscm as HF	<0.0178	<0.0184	<0.0181
ppmvd as HF	<0.0214	<0.0221	<0.0218
ppmvd @ 7% O_2 as HF	<0.0398	<0.0472	<0.0435
lb/hr as HF	<2.75E-03	<3.06E-03	<2.91E-03
lb/1000 lb steam as HF	<4.51E-05	<5.54E-05	<5.02E-05

Appendix A.6
Multi Metals Calculations/Results

SOURCE TEST DATA SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number	Run 1	Run 2	Average
Date	12/7/21	12/7/21	--
Start / Stop time	1337-1545	1605-1812	--
Meter Box Number	MB30	MB30	--
Meter Calibration (Y_d)	0.9954	0.9954	--
Sample Time, minutes	120	120	--
Pitot Coefficient	0.84	0.84	--
Nozzle Diameter, inches	0.187	0.186	--
1000 lb-steam/hr	58.9	54.4	56.7
Barometric pressure, in Hg	29.72	29.72	29.72
Meter box volume, acf	75.232	80.213	77.723
Impinger liquid volume, ml	259.1	222.6	240.9
Meter temperature, °F	63.0	72.9	68.0
Meter pressure, (Delta H) iwg	1.293	1.415	1.354
Velocity head, (Delta P) iwg	1.6786	1.8635	1.771
Static pressure, iwg	-0.84	-0.82	-0.83
Stack temperature, °F	222.7	231.4	227.0
O_2, % volume dry	13.43	14.38	13.91
CO_2, % volume dry	6.28	5.45	5.86
1a Standard sample volume, dscf	75.337	78.854	77.095
1b Water vapor volume, scf	12.217	10.496	11.356
Moisture fraction, nondimensional	0.1395	0.1175	0.1285
Moisture fraction saturated, nondimensional	NA	NA	#DIV/0!
1c Moisture fraction applicable, nondimensional	0.1395	0.1175	0.1285
1d Stack gas molecular weight, dry	29.542	29.447	29.494
1e Stack gas molecular weight, wet	27.932	28.102	28.017
1f Absolute stack pressure, in Hg	29.658	29.660	29.659
1g Stack gas velocity, ft/sec	84.460	89.284	86.872
1h Stack flow rate, acfm	63,681	67,319	65,500
1i Stack flow rate, wscfm	48,823	50,961	49,892
1j Stack flow rate, dscfm	42,010	44,974	43,492
Isokinetic ratio, %	98.46	97.30	97.88

LAB DATA SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number	1-MDL	2-MDL	**Reagent Blank**		Run 1		Run 2		Average	
Date	Method		x		12/7/21		12/7/21		--	
Start / Stop time	Detection Limits		--		1337-1545		1605-1812		--	
			Flag	Result	Flag	Result	Flag	Result	Flag	Result
Aluminum (Al), µg	25.0	25.0	ADL	102	ADL	155	ADL	114	ADL	135
Antimony (Sb), µg	0.250	0.250	ND	0.250	ADL	0.272	ADL	0.549	ADL	0.411
Arsenic (As), µg	0.250	0.250	ADL	0.254	ADL	0.500	ADL	0.694	ADL	0.597
Barium (Ba), µg	0.455	0.455	ADL	6.29	ADL	5.57	ADL	5.49	ADL	5.53
Beryllium (Be), µg	0.0500	0.0500	ND	0.0500	ND	0.0500	ND	0.0500	ND	0.0500
Cadmium (Cd), µg	0.0500	0.0500	ADL	0.226	ADL	1.47	ADL	0.384	ADL	0.927
Chromium (Cr), µg	0.270	0.270	ADL	1.36	ADL	10.1	ADL	8.12	ADL	9.11
Cobalt (Co), µg	0.0500	0.0500	ND	0.0500	ADL	0.218	ADL	0.178	ADL	0.198
Copper (Cu), µg	0.250	0.250	ADL	0.313	ADL	1.14	ADL	1.89	ADL	1.52
Iron (Fe), µg	10.0	10.0	ADL	19.4	ADL	381	ADL	297	ADL	339
Lead (Pb), µg	0.0100	0.0100	ND	0.0100	ADL	0.613	ADL	0.807	ADL	0.710
Manganese (Mn), µg	0.100	0.100	ADL	0.981	ADL	5.18	ADL	8.00	ADL	6.59
Mercury (Hg)										
Front Half, µg	0.0250	0.0250	ND	0.0250	ND	0.0250	ADL	0.0260	DLL	0.0255
Impingers (HNO_3/H_2O_2), µg	0.148	0.148	ND	0.148	ADL	1.63	ADL	2.41	ADL	2.02
Impinger (Empty), µg	0.0255	0.0187	ND	0.0237	ND	0.0255	ND	0.0187	ND	0.0221
Impingers ($H_2SO_4/KMnO_4$), µg	0.0795	0.0672	ND	0.0200	ND	0.0795	ND	0.0672	ND	0.0734
HCl Rinse, µg	0.0795	0.0672	ADL	0.0647	ADL	0.116	ADL	0.109	ADL	0.113
Total Mercury (Hg), µg	**0.358**	**0.326**	DLL	**0.281**	DLL	**1.88**	DLL	**2.63**	DLL	**2.25**
Molybdenum (Mo), µg	2.50	2.50	ADL	10.7	ADL	11.3	ADL	11.2	ADL	11.3
Nickel (Ni), µg	0.650	0.650	ADL	2.89	ADL	7.96	ADL	6.20	ADL	7.08
Phosphorus (P), µg	2.50	2.50	ND	2.50	ADL	3.36	ADL	2.54	ADL	2.95
Potassium (K), µg	25.0	25.0	ADL	48.6	ADL	70.0	ADL	66.7	ADL	68.4
Selenium (Se), µg	0.250	0.250	ND	0.250	ND	0.250	ND	0.250	ND	0.250
Silver (Ag), µg	0.0450	0.0450	ND	0.0450	ADL	0.151	ADL	0.0484	ADL	0.0997
Thallium (Tl), µg	0.100	0.100	ND	0.100	ND	0.100	ND	0.100	ND	0.100
Vanadium (V), µg	5.00	5.00	ND	5.00	ND	5.00	ND	5.00	ND	5.00
Zinc (Zn), µg	1.25	1.25	ADL	4.64	ADL	18.5	ADL	14.9	ADL	16.7

Flags: ND - The result was measured below the RL and could not be approximated by the lab.
ADL - The result was detected in the fraction.
DLL - The result was detected in some fractions that contribute to this calculation, but not all.

BLANK CORRECTION SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, (ft^2)	12.57
Reference temperature, °F	68.00
Filter size, mm	90

Test number	Run 1	Run 2	Average
Date	12/7/21	12/7/21	--
Start / Stop time	1337-1545	1605-1812	--
Aluminum (Al), Mfh, µg	**155.00**	**114.00**	**134.50**
Aluminum (Al), Mmdl, µg	25.000	25.000	25.000
Aluminum (Al), Mfhb exceeds A, µg	Yes	Yes	
Aluminum (Al), I. "A", µg	13.8	13.8	13.8
Aluminum (Al), II.a Mfhb, µg (detected)	102.00	102.00	102.00
Aluminum (Al), II.b 5% of Mfh, µg	7.75	5.70	6.73
Aluminum (Al), II final - lesser of II(a) or II(b), µg	7.75	5.70	6.73
Aluminum (Al), Greater of I or II, µg	13.80	13.80	13.80
Aluminum (Al), Mfhb - final, µg	13.80	13.80	13.80
Aluminum (Al), Mfh - Mfhb, µg	141.20	100.20	120.70
Aluminum (Al), Mfh, blank corrected final, µg	**141.195**	**100.195**	**120.695**
Antimony (Sb), µg	**0.27**	**0.55**	**0.41**
Antimony (Sb), Mmdl, µg	0.250	0.250	0.250
Antimony (Sb), Mfhb exceeds A, µg	No	No	
Antimony (Sb), I. "A", µg	13.8	13.8	13.8
Antimony (Sb), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Antimony (Sb), II.b 5% of Mfh, µg	0.01	0.03	0.02
Antimony (Sb), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Antimony (Sb), Greater of I or II, µg	13.80	13.80	13.80
Antimony (Sb), Mfhb - final, µg	0.00	0.00	0.00
Antimony (Sb), Mfh - Mfhb, µg	0.27	0.55	0.41
Antimony (Sb), Mfh, blank corrected final, µg	**0.272**	**0.549**	**0.411**

Arsenic (As), µg	**0.50**	**0.69**	**0.60**
Arsenic (As), Mmdl, µg	0.250	0.250	0.250
Arsenic (As), Mfhb exceeds A, µg	No	No	
Arsenic (As), I. "A", µg	13.8	13.8	13.8
Arsenic (As), II.a Mfhb, µg (detected)	0.25	0.25	0.25
Arsenic (As), II.b 5% of Mfh, µg	0.03	0.03	0.03
Arsenic (As), II final - lesser of II(a) or II(b), µg	0.03	0.03	0.03
Arsenic (As), Greater of I or II, µg	13.80	13.80	13.80
Arsenic (As), Mfhb - final, µg	0.25	0.25	0.25
Arsenic (As), Mfh - Mfhb, µg	0.25	0.44	0.34
Arsenic (As), Mfh, blank corrected final, µg	**0.250**	**0.440**	**0.345**
Barium (Ba), µg	**5.57**	**5.49**	**5.53**
Barium (Ba), Mmdl, µg	0.455	0.455	0.455
Barium (Ba), Mfhb exceeds A, µg	No	No	
Barium (Ba), I. "A", µg	13.8	13.8	13.8
Barium (Ba), II.a Mfhb, µg (detected)	6.29	6.29	6.29
Barium (Ba), II.b 5% of Mfh, µg	0.28	0.27	0.28
Barium (Ba), II final - lesser of II(a) or II(b), µg	0.28	0.27	0.28
Barium (Ba), Greater of I or II, µg	13.80	13.80	13.80
Barium (Ba), Mfhb - final, µg	6.29	6.29	6.29
Barium (Ba), Mfh - Mfhb, µg	-0.72	-0.80	-0.76
Barium (Ba), Mfh, blank corrected final, µg	**0.455**	**0.455**	**0.455**
Beryllium (Be), µg	**0.05**	**0.05**	**0.05**
Beryllium (Be), Mmdl, µg	0.050	0.050	0.050
Beryllium (Be), Mfhb exceeds A, µg	No	No	
Beryllium (Be), I. "A", µg	13.8	13.8	13.8
Beryllium (Be), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Beryllium (Be), II.b 5% of Mfh, µg	0.00	0.00	0.00
Beryllium (Be), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Beryllium (Be), Greater of I or II, µg	13.80	13.80	13.80
Beryllium (Be), Mfhb - final, µg	0.00	0.00	0.00
Beryllium (Be), Mfh - Mfhb, µg	0.05	0.05	0.05
Beryllium (Be), Mfh, blank corrected final, µg	**0.050**	**0.050**	**0.050**
Cadmium (Cd), µg	**1.47**	**0.38**	**0.93**
Cadmium (Cd), Mmdl, µg	0.050	0.050	0.050
Cadmium (Cd), Mfhb exceeds A, µg	No	No	
Cadmium (Cd), I. "A", µg	13.8	13.8	13.8
Cadmium (Cd), II.a Mfhb, µg (detected)	0.23	0.23	0.23
Cadmium (Cd), II.b 5% of Mfh, µg	0.07	0.02	0.05
Cadmium (Cd), II final - lesser of II(a) or II(b), µg	0.07	0.02	0.05
Cadmium (Cd), Greater of I or II, µg	13.80	13.80	13.80
Cadmium (Cd), Mfhb - final, µg	0.23	0.23	0.23
Cadmium (Cd), Mfh - Mfhb, µg	1.24	0.16	0.70
Cadmium (Cd), Mfh, blank corrected final, µg	**1.244**	**0.158**	**0.701**
Chromium (Cr), µg	**10.10**	**8.12**	**9.11**
Chromium (Cr), Mmdl, µg	0.270	0.270	0.270
Chromium (Cr), Mfhb exceeds A, µg	No	No	
Chromium (Cr), I. "A", µg	13.8	13.8	13.8
Chromium (Cr), II.a Mfhb, µg (detected)	1.36	1.36	1.36
Chromium (Cr), II.b 5% of Mfh, µg	0.51	0.41	0.46
Chromium (Cr), II final - lesser of II(a) or II(b), µg	0.51	0.41	0.46
Chromium (Cr), Greater of I or II, µg	13.80	13.80	13.80
Chromium (Cr), Mfhb - final, µg	1.36	1.36	1.36
Chromium (Cr), Mfh - Mfhb, µg	8.74	6.76	7.75
Chromium (Cr), Mfh, blank corrected final, µg	**8.740**	**6.760**	**7.750**
Cobalt (Co), µg	**0.22**	**0.18**	**0.20**
Cobalt (Co), Mmdl, µg	0.050	0.050	0.050
Cobalt (Co), Mfhb exceeds A, µg	No	No	
Cobalt (Co), I. "A", µg	13.8	13.8	13.8
Cobalt (Co), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Cobalt (Co), II.b 5% of Mfh, µg	0.01	0.01	0.01
Cobalt (Co), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Cobalt (Co), Greater of I or II, µg	13.80	13.80	13.80
Cobalt (Co), Mfhb - final, µg	0.00	0.00	0.00
Cobalt (Co), Mfh - Mfhb, µg	0.22	0.18	0.20
Cobalt (Co), Mfh, blank corrected final, µg	**0.218**	**0.178**	**0.198**
Copper (Cu), µg	**1.14**	**1.89**	**1.52**
Copper (Cu), Mmdl, µg	0.250	0.250	0.250
Copper (Cu), Mfhb exceeds A, µg	No	No	
Copper (Cu), I. "A", µg	13.8	13.8	13.8
Copper (Cu), II.a Mfhb, µg (detected)	0.31	0.31	0.31
Copper (Cu), II.b 5% of Mfh, µg	0.06	0.09	0.08
Copper (Cu), II final - lesser of II(a) or II(b), µg	0.06	0.09	0.08
Copper (Cu), Greater of I or II, µg	13.80	13.80	13.80
Copper (Cu), Mfhb - final, µg	0.31	0.31	0.31
Copper (Cu), Mfh - Mfhb, µg	0.83	1.58	1.20
Copper (Cu), Mfh, blank corrected final, µg	**0.827**	**1.577**	**1.202**

Iron (Fe), µg	**381.00**	**297.00**	**339.00**
Iron (Fe), Mmdl, µg	10.000	10.000	10.000
Iron (Fe), Mfhb exceeds A, µg	Yes	Yes	
Iron (Fe), I. "A", µg	13.8	13.8	13.8
Iron (Fe), II.a Mfhb, µg (detected)	19.40	19.40	19.40
Iron (Fe), II.b 5% of Mfh, µg	19.05	14.85	16.95
Iron (Fe), II final - lesser of II(a) or II(b), µg	19.05	14.85	16.95
Iron (Fe), Greater of I or II, µg	19.05	14.85	16.95
Iron (Fe), Mfhb - final, µg	19.05	14.85	16.95
Iron (Fe), Mfh - Mfhb, µg	361.95	282.15	322.05
Iron (Fe), Mfh, blank corrected final, µg	**361.950**	**282.150**	**322.050**
Lead (Pb), µg	**0.61**	**0.81**	**0.71**
Lead (Pb), Mmdl, µg	0.010	0.010	0.010
Lead (Pb), Mfhb exceeds A, µg	No	No	
Lead (Pb), I. "A", µg	13.8	13.8	13.8
Lead (Pb), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Lead (Pb), II.b 5% of Mfh, µg	0.03	0.04	0.04
Lead (Pb), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Lead (Pb), Greater of I or II, µg	13.80	13.80	13.80
Lead (Pb), Mfhb - final, µg	0.00	0.00	0.00
Lead (Pb), Mfh - Mfhb, µg	0.61	0.81	0.71
Lead (Pb), Mfh, blank corrected final, µg	**0.613**	**0.807**	**0.710**
Manganese (Mn), µg	**5.18**	**8.00**	**6.59**
Manganese (Mn), Mmdl, µg	0.100	0.100	0.100
Manganese (Mn), Mfhb exceeds A, µg	No	No	
Manganese (Mn), I. "A", µg	13.8	13.8	13.8
Manganese (Mn), II.a Mfhb, µg (detected)	0.98	0.98	0.98
Manganese (Mn), II.b 5% of Mfh, µg	0.26	0.40	0.33
Manganese (Mn), II final - lesser of II(a) or II(b), µg	0.26	0.40	0.33
Manganese (Mn), Greater of I or II, µg	13.80	13.80	13.80
Manganese (Mn), Mfhb - final, µg	0.98	0.98	0.98
Manganese (Mn), Mfh - Mfhb, µg	4.20	7.02	5.61
Manganese (Mn), Mfh, blank corrected final, µg	**4.199**	**7.019**	**5.609**
Mercury (Hg), front half, µg	**0.03**	**0.03**	**0.03**
Mercury (Hg), back half, µg	**1.85**	**2.60**	**2.23**
Mercury (Hg) - FH, Mmdl, µg	0.025	0.025	0.025
Mercury (Hg) - BH, Mmdl, µg	0.333	0.301	0.317
Mercury (Hg), (Hgfhb + Hgbhb) exceeds 0.6 µg	No	No	
Mercury (Hg), I. 0.60, µg	0.6	0.6	0.6
Mercury (Hg), II.a.1 Hgfhb, µg (detected)	0.00	0.00	0.00
Mercury (Hg), II.a.2 Hgbhb, µg (detected)	0.06	0.06	0.06
Mercury (Hg), II.a (Hgfhb + Hgbhb), µg (detected)	0.06	0.06	0.06
Mercury (Hg), II.b 5% of (Hgfh+Hgbh), µg	0.09	0.13	0.11
Mercury (Hg), II final - lesser of II(a) or II(b), µg	0.06	0.06	0.06
Mercury (Hg), Greater of I or II, µg	0.60	0.60	0.60
Mercury (Hg), (Hgfhb + Hgbhb) - final, µg	0.06	0.06	0.06
Mercury (Hg), (Hgfh - Hgfhb) + (Hgbh - Hgbhb), µg	1.81	2.57	2.19
Mercury (Hg), total, blank corrected final, µg	**1.811**	**2.566**	**2.189**
Molybdenum (Mo), µg	**11.30**	**11.20**	**11.25**
Molybdenum (Mo), Mmdl, µg	2.500	2.500	2.500
Molybdenum (Mo), Mfhb exceeds A, µg	No	No	
Molybdenum (Mo), I. "A", µg	13.8	13.8	13.8
Molybdenum (Mo), II.a Mfhb, µg (detected)	10.70	10.70	10.70
Molybdenum (Mo), II.b 5% of Mfh, µg	0.57	0.56	0.56
Molybdenum (Mo), II final - lesser of II(a) or II(b), µg	0.57	0.56	0.56
Molybdenum (Mo), Greater of I or II, µg	13.80	13.80	13.80
Molybdenum (Mo), Mfhb - final, µg	10.70	10.70	10.70
Molybdenum (Mo), Mfh - Mfhb, µg	0.60	0.50	0.55
Molybdenum (Mo), Mfh, blank corrected final, µg	**2.500**	**2.500**	**2.500**
Nickel (Ni), µg	**7.96**	**6.20**	**7.08**
Nickel (Ni), Mmdl, µg	0.650	0.650	0.650
Nickel (Ni), Mfhb exceeds A, µg	No	No	
Nickel (Ni), I. "A", µg	13.8	13.8	13.8
Nickel (Ni), II.a Mfhb, µg (detected)	2.89	2.89	2.89
Nickel (Ni), II.b 5% of Mfh, µg	0.40	0.31	0.35
Nickel (Ni), II final - lesser of II(a) or II(b), µg	0.40	0.31	0.35
Nickel (Ni), Greater of I or II, µg	13.80	13.80	13.80
Nickel (Ni), Mfhb - final, µg	2.89	2.89	2.89
Nickel (Ni), Mfh - Mfhb, µg	5.07	3.31	4.19
Nickel (Ni), Mfh, blank corrected final, µg	**5.070**	**3.310**	**4.190**
Phosphorus (P), µg	**3.36**	**2.54**	**2.95**
Phosphorus (P), Mmdl, µg	2.500	2.500	2.500
Phosphorus (P), Mfhb exceeds A, µg	No	No	
Phosphorus (P), I. "A", µg	13.8	13.8	13.8
Phosphorus (P), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Phosphorus (P), II.b 5% of Mfh, µg	0.17	0.13	0.15
Phosphorus (P), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Phosphorus (P), Greater of I or II, µg	13.80	13.80	13.80
Phosphorus (P), Mfhb - final, µg	0.00	0.00	0.00
Phosphorus (P), Mfh - Mfhb, µg	3.36	2.54	2.95
Phosphorus (P), Mfh, blank corrected final, µg	**3.360**	**2.540**	**2.950**

Potassium (K), µg	**70.00**	**66.70**	**68.35**
Potassium (K), Mmdl, µg	25.000	25.000	25.000
Potassium (K), Mfhb exceeds A, µg	Yes	Yes	
Potassium (K), I. "A", µg	13.8	13.8	13.8
Potassium (K), II.a Mfhb, µg (detected)	48.60	48.60	48.60
Potassium (K), II.b 5% of Mfh, µg	3.50	3.34	3.42
Potassium (K), II final - lesser of II(a) or II(b), µg	3.50	3.34	3.42
Potassium (K), Greater of I or II, µg	13.80	13.80	13.80
Potassium (K), Mfhb - final, µg	13.80	13.80	13.80
Potassium (K), Mfh - Mfhb, µg	56.20	52.90	54.55
Potassium (K), Mfh, blank corrected final, µg	**56.195**	**52.895**	**54.545**
Selenium (Se), µg	**0.25**	**0.25**	**0.25**
Selenium (Se), Mmdl, µg	0.250	0.250	0.250
Selenium (Se), Mfhb exceeds A, µg	No	No	
Selenium (Se), I. "A", µg	13.8	13.8	13.8
Selenium (Se), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Selenium (Se), II.b 5% of Mfh, µg	0.01	0.01	0.01
Selenium (Se), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Selenium (Se), Greater of I or II, µg	13.80	13.80	13.80
Selenium (Se), Mfhb - final, µg	0.00	0.00	0.00
Selenium (Se), Mfh - Mfhb, µg	0.25	0.25	0.25
Selenium (Se), Mfh, blank corrected final, µg	**0.250**	**0.250**	**0.250**
Silver (Ag), µg	**0.15**	**0.05**	**0.10**
Silver (Ag), Mmdl, µg	0.045	0.045	0.045
Silver (Ag), Mfhb exceeds A, µg	No	No	
Silver (Ag), I. "A", µg	13.8	13.8	13.8
Silver (Ag), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Silver (Ag), II.b 5% of Mfh, µg	0.01	0.00	0.00
Silver (Ag), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Silver (Ag), Greater of I or II, µg	13.80	13.80	13.80
Silver (Ag), Mfhb - final, µg	0.00	0.00	0.00
Silver (Ag), Mfh - Mfhb, µg	0.15	0.05	0.10
Silver (Ag), Mfh, blank corrected final, µg	**0.151**	**0.048**	**0.100**
Thallium (Tl), µg	**0.10**	**0.10**	**0.10**
Thallium (Tl), Mmdl, µg	0.100	0.100	0.100
Thallium (Tl), Mfhb exceeds A, µg	No	No	
Thallium (Tl), I. "A", µg	13.8	13.8	13.8
Thallium (Tl), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Thallium (Tl), II.b 5% of Mfh, µg	0.01	0.01	0.01
Thallium (Tl), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Thallium (Tl), Greater of I or II, µg	13.80	13.80	13.80
Thallium (Tl), Mfhb - final, µg	0.00	0.00	0.00
Thallium (Tl), Mfh - Mfhb, µg	0.10	0.10	0.10
Thallium (Tl), Mfh, blank corrected final, µg	**0.100**	**0.100**	**0.100**
Vanadium (V), µg	**5.00**	**5.00**	**5.00**
Vanadium (V), Mmdl, µg	5.000	5.000	5.000
Vanadium (V), Mfhb exceeds A, µg	No	No	
Vanadium (V), I. "A", µg	13.8	13.8	13.8
Vanadium (V), II.a Mfhb, µg (detected)	0.00	0.00	0.00
Vanadium (V), II.b 5% of Mfh, µg	0.25	0.25	0.25
Vanadium (V), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Vanadium (V), Greater of I or II, µg	13.80	13.80	13.80
Vanadium (V), Mfhb - final, µg	0.00	0.00	0.00
Vanadium (V), Mfh - Mfhb, µg	5.00	5.00	5.00
Vanadium (V), Mfh, blank corrected final, µg	**5.000**	**5.000**	**5.000**
Zinc (Zn), µg	**18.50**	**14.90**	**16.70**
Zinc (Zn), Mmdl, µg	1.250	1.250	1.250
Zinc (Zn), Mfhb exceeds A, µg	No	No	
Zinc (Zn), I. "A", µg	13.8	13.8	13.8
Zinc (Zn), II.a Mfhb, µg (detected)	4.64	4.64	4.64
Zinc (Zn), II.b 5% of Mfh, µg	0.93	0.75	0.84
Zinc (Zn), II final - lesser of II(a) or II(b), µg	0.93	0.75	0.84
Zinc (Zn), Greater of I or II, µg	13.80	13.80	13.80
Zinc (Zn), Mfhb - final, µg	4.64	4.64	4.64
Zinc (Zn), Mfh - Mfhb, µg	13.86	10.26	12.06
Zinc (Zn), Mfh, blank corrected final, µg	**13.860**	**10.260**	**12.060**

RESULTS SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
O_2, % volume dry		13.43		14.38		13.91
CO_2, % volume dry		6.28		5.45		5.86
Stack Temperature, °F		222.7		231.4		227.0
Moisture Content, % by volume		13.95		11.75		12.85
Stack Flow Rate, dscfm		42,010		44,974		43,492
Standard Sample Volume, dscf		75.337		78.854		77.095
Aluminum (Al)						
mg/dscm	ADL	0.066	ADL	0.045	ADL	0.056
mg/dscm @ 7% O_2	ADL	0.12	ADL	0.096	ADL	0.11
lb/hr	ADL	0.010	ADL	0.0076	ADL	0.0090
lb/1000 lb steam	ADL	1.77E-04	ADL	1.39E-04	ADL	1.58E-04
Antimony (Sb)						
mg/dscm	ADL	1.27E-04	ADL	2.46E-04	ADL	1.87E-04
mg/dscm @ 7% O_2	ADL	2.37E-04	ADL	5.24E-04	ADL	3.81E-04
lb/hr	ADL	2.00E-05	ADL	4.14E-05	ADL	3.07E-05
lb/1000 lb steam	ADL	3.40E-07	ADL	7.61E-07	ADL	5.51E-07
Arsenic (As)						
mg/dscm	ADL	1.17E-04	ADL	1.97E-04	ADL	1.57E-04
mg/dscm @ 7% O_2	ADL	2.18E-04	ADL	4.20E-04	ADL	3.19E-04
lb/hr	ADL	1.84E-05	ADL	3.32E-05	ADL	2.58E-05
lb/1000 lb steam	ADL	3.13E-07	ADL	6.10E-07	ADL	4.61E-07
Barium (Ba)						
mg/dscm	ADL	2.13E-04	ADL	2.04E-04	ADL	2.09E-04
mg/dscm @ 7% O_2	ADL	3.97E-04	ADL	4.34E-04	ADL	4.16E-04
lb/hr	ADL	3.35E-05	ADL	3.43E-05	ADL	3.39E-05
lb/1000 lb steam	ADL	5.69E-07	ADL	6.30E-07	ADL	6.00E-07
Beryllium (Be)						
mg/dscm	ND	2.34E-05	ND	2.24E-05	ND	2.29E-05
mg/dscm @ 7% O_2	ND	4.36E-05	ND	4.77E-05	ND	4.57E-05
lb/hr	ND	3.68E-06	ND	3.77E-06	ND	3.73E-06
Cadmium (Cd)						
mg/dscm	ADL	5.83E-04	ADL	7.08E-05	ADL	3.27E-04
mg/dscm @ 7% O_2	ADL	1.08E-03	ADL	1.51E-04	ADL	6.18E-04
lb/hr	ADL	9.17E-05	ADL	1.19E-05	ADL	5.18E-05
lb/1000 lb steam	ADL	1.56E-06	ADL	2.19E-07	ADL	8.88E-07
Chromium (Cr)						
mg/dscm	ADL	4.10E-03	ADL	3.03E-03	ADL	3.56E-03
mg/dscm @ 7% O_2	ADL	7.62E-03	ADL	6.45E-03	ADL	7.04E-03
lb/hr	ADL	6.44E-04	ADL	5.10E-04	ADL	5.77E-04
lb/1000 lb steam	ADL	1.09E-05	ADL	9.37E-06	ADL	1.02E-05
Cobalt (Co)						
mg/dscm	ADL	1.02E-04	ADL	7.97E-05	ADL	9.09E-05
mg/dscm @ 7% O_2	ADL	1.90E-04	ADL	1.70E-04	ADL	1.80E-04
lb/hr	ADL	1.61E-05	ADL	1.34E-05	ADL	1.47E-05
lb/1000 lb steam	ADL	2.73E-07	ADL	2.47E-07	ADL	2.60E-07
Copper (Cu)						
mg/dscm	ADL	3.88E-04	ADL	7.06E-04	ADL	5.47E-04
mg/dscm @ 7% O_2	ADL	7.21E-04	ADL	1.51E-03	ADL	1.11E-03
lb/hr	ADL	6.09E-05	ADL	1.19E-04	ADL	8.99E-05
lb/1000 lb steam	ADL	1.03E-06	ADL	2.19E-06	ADL	1.61E-06
Iron (Fe)						
mg/dscm	ADL	0.17	ADL	0.13	ADL	0.15
mg/dscm @ 7% O_2	ADL	0.32	ADL	0.27	ADL	0.29
lb/hr	ADL	0.027	ADL	0.021	ADL	0.024
lb/1000 lb steam	ADL	4.53E-04	ADL	3.91E-04	ADL	4.22E-04
Lead (Pb)						
mg/dscm	ADL	2.87E-04	ADL	3.61E-04	ADL	3.24E-04
mg/dscm @ 7% O_2	ADL	5.35E-04	ADL	7.70E-04	ADL	6.53E-04
lb/hr	ADL	4.52E-05	ADL	6.08E-05	ADL	5.30E-05
lb/1000 lb steam	ADL	7.67E-07	ADL	1.12E-06	ADL	9.43E-07
Manganese (Mn)						
mg/dscm	ADL	1.97E-03	ADL	3.14E-03	ADL	2.56E-03
mg/dscm @ 7% O_2	ADL	3.66E-03	ADL	6.70E-03	ADL	5.18E-03
lb/hr	ADL	3.09E-04	ADL	5.29E-04	ADL	4.19E-04
lb/1000 lb steam	ADL	5.25E-06	ADL	9.73E-06	ADL	7.49E-06

RESULTS SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
O_2, % volume dry		13.43		14.38		13.91
CO_2, % volume dry		6.28		5.45		5.86
Stack Temperature, °F		222.7		231.4		227.0
Moisture Content, % by volume		13.95		11.75		12.85
Stack Flow Rate, dscfm		42,010		44,974		43,492
Standard Sample Volume, dscf		75.337		78.854		77.095
Mercury (Hg)						
mg/dscm	DLL	8.49E-04	DLL	1.15E-03	DLL	9.99E-04
mg/dscm @ 7% O_2	DLL	1.58E-03	DLL	2.45E-03	DLL	2.01E-03
lb/hr	DLL	1.33E-04	DLL	1.93E-04	DLL	1.63E-04
lb/1000 lb steam	DLL	2.27E-06	DLL	3.56E-06	DLL	2.91E-06
Molybdenum (Mo)						
mg/dscm	ADL	1.17E-03	ADL	1.12E-03	ADL	1.15E-03
mg/dscm @ 7% O_2	ADL	2.18E-03	ADL	2.39E-03	ADL	2.28E-03
lb/hr	ADL	1.84E-04	ADL	1.88E-04	ADL	1.86E-04
lb/1000 lb steam	ADL	3.13E-06	ADL	3.46E-06	ADL	3.30E-06
Nickel (Ni)						
mg/dscm	ADL	2.38E-03	ADL	1.48E-03	ADL	1.93E-03
mg/dscm @ 7% O_2	ADL	4.42E-03	ADL	3.16E-03	ADL	3.79E-03
lb/hr	ADL	3.74E-04	ADL	2.49E-04	ADL	3.12E-04
lb/1000 lb steam	ADL	6.34E-06	ADL	4.59E-06	ADL	5.46E-06
Phosphorus (P)						
mg/dscm	ADL	1.57E-03	ADL	1.14E-03	ADL	1.36E-03
mg/dscm @ 7% O_2	ADL	2.93E-03	ADL	2.42E-03	ADL	2.68E-03
lb/hr	ADL	2.48E-04	ADL	1.91E-04	ADL	2.20E-04
lb/1000 lb steam	ADL	4.20E-06	ADL	3.52E-06	ADL	3.86E-06
Potassium (K)						
mg/dscm	ADL	2.63E-02	ADL	2.37E-02	ADL	2.50E-02
mg/dscm @ 7% O_2	ADL	4.90E-02	ADL	5.05E-02	ADL	4.98E-02
lb/hr	ADL	4.14E-03	ADL	3.99E-03	ADL	4.06E-03
lb/1000 lb steam	ADL	7.03E-05	ADL	7.33E-05	ADL	7.18E-05
Selenium (Se)						
mg/dscm	ND	1.17E-04	ND	1.12E-04	ND	1.15E-04
mg/dscm @ 7% O_2	ND	2.18E-04	ND	2.39E-04	ND	2.28E-04
lb/hr	ND	1.84E-05	ND	1.88E-05	ND	1.86E-05
lb/1000 lb steam	ND	3.13E-07	ND	3.46E-07	ND	3.30E-07
Silver (Ag)						
mg/dscm	ADL	7.08E-05	ADL	2.17E-05	ADL	4.62E-05
mg/dscm @ 7% O_2	ADL	1.32E-04	ADL	4.62E-05	ADL	8.89E-05
lb/hr	ADL	1.11E-05	ADL	3.65E-06	ADL	7.39E-06
lb/1000 lb steam	ADL	1.89E-07	ADL	6.71E-08	ADL	1.28E-07
Thallium (Tl)						
mg/dscm	ND	4.69E-05	ND	4.48E-05	ND	4.58E-05
mg/dscm @ 7% O_2	ND	8.72E-05	ND	9.55E-05	ND	9.13E-05
lb/hr	ND	7.37E-06	ND	7.54E-06	ND	7.45E-06
lb/1000 lb steam	ND	1.25E-07	ND	1.39E-07	ND	1.32E-07
Vanadium (V)						
mg/dscm	ND	2.34E-03	ND	2.24E-03	ND	2.29E-03
mg/dscm @ 7% O_2	ND	4.36E-03	ND	4.77E-03	ND	4.57E-03
lb/hr	ND	3.68E-04	ND	3.77E-04	ND	3.73E-04
lb/1000 lb steam	ND	6.26E-06	ND	6.93E-06	ND	6.59E-06
Zinc (Zn)						
mg/dscm	ADL	6.50E-03	ADL	4.59E-03	ADL	5.55E-03
mg/dscm @ 7% O_2	ADL	1.21E-02	ADL	9.79E-03	ADL	1.09E-02
lb/hr	ADL	1.02E-03	ADL	7.73E-04	ADL	8.97E-04
lb/1000 lb steam	ADL	1.73E-05	ADL	1.42E-05	ADL	1.58E-05

LAB DATA SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68.0

Test number	1-MDL	2-MDL	**Reagent Blank**		Run 1		Run 2		Average	
Date	Method		--		12/7/21		12/7/21		--	
Start / Stop time	Detection Limits		--		1337-1545		1605-1812		--	
			Flag	Result	Flag	Result	Flag	Result	Flag	Result
Aluminum (Al), µg	5.53	5.60	ND	5.46	ADL	12.2	ADL	11.5	ADL	11.9
Antimony (Sb), µg	0.0553	0.0560	ND	0.0546	ND	0.0553	ADL	0.112	DLL	0.0837
Arsenic (As), µg	0.277	0.280	ND	0.273	ND	0.277	ND	0.280	ND	0.279
Barium (Ba), µg	0.0221	0.0224	ADL	0.113	ADL	1.65	ADL	1.59	ADL	1.62
Beryllium (Be), µg	0.0111	0.0112	ND	0.0109	ND	0.0111	ND	0.0112	ND	0.0112
Cadmium (Cd), µg	0.0111	0.0112	ND	0.0109	ADL	0.0741	ADL	0.155	ADL	0.115
Chromium (Cr), µg	0.0852	0.0863	ND	0.0841	ADL	0.481	ADL	0.422	ADL	0.452
Cobalt (Co), µg	0.0553	0.0560	ND	0.0546	ND	0.0553	ADL	0.0700	DLL	0.0627
Copper (Cu), µg	0.0553	0.0560	ND	0.0546	ADL	0.851	ADL	0.810	ADL	0.831
Iron (Fe), µg	2.21	2.24	ND	2.19	ADL	17.7	ADL	16.9	ADL	17.3
Lead (Pb), µg	0.0111	0.0112	ND	0.0109	ADL	0.537	ADL	1.94	ADL	1.24
Manganese (Mn), µg	0.0221	0.0224	ADL	0.0939	ADL	0.894	ADL	8.96	ADL	4.93
Molybdenum (Mo), µg	0.553	0.560	ND	0.546	ND	0.553	ND	0.560	ND	0.557
Nickel (Ni), µg	0.0619	0.0627	ADL	0.101	ADL	0.662	ADL	1.12	ADL	0.891
Phosphorus (P), µg	0.553	0.560	ADL	1.42	ADL	3.18	ADL	2.44	ADL	2.81
Potassium (K), µg	5.53	5.60	ND	5.46	ADL	22.8	ADL	19.4	ADL	21.1
Selenium (Se), µg	0.0553	0.0560	ND	0.0546	ADL	0.119	ADL	0.0620	ADL	0.0905
Silver (Ag), µg	0.0553	0.0560	ND	0.0546	ADL	0.0745	ADL	0.105	ADL	0.0898
Thallium (Tl), µg	0.0111	0.0112	ND	0.0109	ND	0.0111	ND	0.0112	ND	0.0112
Vanadium (V), µg	1.11	1.12	ND	1.09	ND	1.11	ND	1.12	ND	1.12
Zinc (Zn), µg	0.487	0.493	ADL	0.0976	ADL	8.37	ADL	12.7	ADL	10.5

Flags: ND - The result was measured below the RL and could not be approximated by the lab.
ADL - The result was detected in the fraction.
DLL - The result was detected in some fractions that contribute to this calculation, but not all.

BLANK CORRECTION SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.57
Reference temperature, °F	68.00

Test number	Run 1	Run 2	Average
Date	12/7/21	12/7/21	--
Start / Stop time	1337-1545	1605-1812	--
Aluminum (Al), Mbh, µg	**12.20**	**11.50**	**11.85**
Aluminum (Al), Mmdl, µg	5.530	5.600	5.565
Aluminum (Al), If Mbhb exceeds 1, µg	No	No	
Aluminum (Al), I. 1 µg	1	1	1
Aluminum (Al), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Aluminum (Al), II.b 5% of Mbh, µg	0.61	0.58	0.59
Aluminum (Al), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Aluminum (Al), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Aluminum (Al), Mbhb - final, µg	0.00	0.00	0.00
Aluminum (Al), Mbh - Mfhb, µg	12.20	11.50	11.85
Aluminum (Al), Mbh, blank corrected final, µg	**12.20**	**11.50**	**11.85**
Antimony (Sb), µg	**0.06**	**0.11**	**0.08**
Antimony (Sb), Mmdl, µg	0.055	0.056	0.056
Antimony (Sb), If Mbhb exceeds 1, µg	No	No	
Antimony (Sb), I. 1 µg	1	1	1
Antimony (Sb), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Antimony (Sb), II.b 5% of Mbh, µg	0.00	0.01	0.00
Antimony (Sb), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Antimony (Sb), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Antimony (Sb), Mbhb - final, µg	0.00	0.00	0.00
Antimony (Sb), Mbh - Mfhb, µg	0.06	0.11	0.08
Antimony (Sb), Mbh, blank corrected final, µg	**0.06**	**0.11**	**0.08**

Arsenic (As), µg	**0.28**	**0.28**	**0.28**
Arsenic (As), Mmdl, µg	0.277	0.280	0.279
Arsenic (As), If Mbhb exceeds 1, µg	No	No	
Arsenic (As), I. 1 µg	1	1	1
Arsenic (As), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Arsenic (As), II.b 5% of Mbh, µg	0.01	0.01	0.01
Arsenic (As), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Arsenic (As), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Arsenic (As), Mbhb - final, µg	0.00	0.00	0.00
Arsenic (As), Mbh - Mfhb, µg	0.28	0.28	0.28
Arsenic (As), Mbh, blank corrected final, µg	**0.28**	**0.28**	**0.28**
Barium (Ba), µg	**1.65**	**1.59**	**1.62**
Barium (Ba), Mmdl, µg	0.022	0.022	0.022
Barium (Ba), If Mbhb exceeds 1, µg	No	No	
Barium (Ba), I. 1 µg	1	1	1
Barium (Ba), II.a Mbhb, µg (detected)	0.11	0.11	0.11
Barium (Ba), II.b 5% of Mbh, µg	0.08	0.08	0.08
Barium (Ba), II final - lesser of II(a) or II(b), µg	0.08	0.08	0.08
Barium (Ba), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Barium (Ba), Mbhb - final, µg	0.11	0.11	0.11
Barium (Ba), Mbh - Mfhb, µg	1.54	1.48	1.51
Barium (Ba), Mbh, blank corrected final, µg	**1.54**	**1.48**	**1.51**
Beryllium (Be), µg	**0.01**	**0.01**	**0.01**
Beryllium (Be), Mmdl, µg	0.011	0.011	0.011
Beryllium (Be), If Mbhb exceeds 1, µg	No	No	
Beryllium (Be), I. 1 µg	1	1	1
Beryllium (Be), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Beryllium (Be), II.b 5% of Mbh, µg	0.00	0.00	0.00
Beryllium (Be), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Beryllium (Be), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Beryllium (Be), Mbhb - final, µg	0.00	0.00	0.00
Beryllium (Be), Mbh - Mfhb, µg	0.01	0.01	0.01
Beryllium (Be), Mbh, blank corrected final, µg	**0.01**	**0.01**	**0.01**
Cadmium (Cd), µg	**0.07**	**0.16**	**0.11**
Cadmium (Cd), Mmdl, µg	0.011	0.011	0.011
Cadmium (Cd), If Mbhb exceeds 1, µg	No	No	
Cadmium (Cd), I. 1 µg	1	1	1
Cadmium (Cd), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Cadmium (Cd), II.b 5% of Mbh, µg	0.00	0.01	0.01
Cadmium (Cd), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Cadmium (Cd), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Cadmium (Cd), Mbhb - final, µg	0.00	0.00	0.00
Cadmium (Cd), Mbh - Mfhb, µg	0.07	0.16	0.11
Cadmium (Cd), Mbh, blank corrected final, µg	**0.07**	**0.16**	**0.11**
Chromium (Cr), µg	**0.48**	**0.42**	**0.45**
Chromium (Cr), Mmdl, µg	0.085	0.086	0.086
Chromium (Cr), If Mbhb exceeds 1, µg	No	No	
Chromium (Cr), I. 1 µg	1	1	1
Chromium (Cr), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Chromium (Cr), II.b 5% of Mbh, µg	0.02	0.02	0.02
Chromium (Cr), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Chromium (Cr), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Chromium (Cr), Mbhb - final, µg	0.00	0.00	0.00
Chromium (Cr), Mbh - Mfhb, µg	0.48	0.42	0.45
Chromium (Cr), Mbh, blank corrected final, µg	**0.48**	**0.42**	**0.45**
Cobalt (Co), µg	**0.06**	**0.07**	**0.06**
Cobalt (Co), Mmdl, µg	0.055	0.056	0.056
Cobalt (Co), If Mbhb exceeds 1, µg	No	No	
Cobalt (Co), I. 1 µg	1	1	1
Cobalt (Co), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Cobalt (Co), II.b 5% of Mbh, µg	0.00	0.00	0.00
Cobalt (Co), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Cobalt (Co), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Cobalt (Co), Mbhb - final, µg	0.00	0.00	0.00
Cobalt (Co), Mbh - Mfhb, µg	0.06	0.07	0.06
Cobalt (Co), Mbh, blank corrected final, µg	**0.06**	**0.07**	**0.06**
Copper (Cu), µg	**0.85**	**0.81**	**0.83**
Copper (Cu), Mmdl, µg	0.055	0.056	0.056
Copper (Cu), If Mbhb exceeds 1, µg	No	No	
Copper (Cu), I. 1 µg	1	1	1
Copper (Cu), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Copper (Cu), II.b 5% of Mbh, µg	0.04	0.04	0.04
Copper (Cu), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Copper (Cu), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Copper (Cu), Mbhb - final, µg	0.00	0.00	0.00
Copper (Cu), Mbh - Mfhb, µg	0.85	0.81	0.83
Copper (Cu), Mbh, blank corrected final, µg	**0.85**	**0.81**	**0.83**

Iron (Fe), µg	**17.70**	**16.90**	**17.30**
Iron (Fe), Mmdl, µg	2.210	2.240	2.225
Iron (Fe), If Mbhb exceeds 1, µg	No	No	
Iron (Fe), I. 1 µg	1	1	1
Iron (Fe), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Iron (Fe), II.b 5% of Mbh, µg	0.89	0.85	0.87
Iron (Fe), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Iron (Fe), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Iron (Fe), Mbhb - final, µg	0.00	0.00	0.00
Iron (Fe), Mbh - Mfhb, µg	17.70	16.90	17.30
Iron (Fe), Mbh, blank corrected final, µg	**17.70**	**16.90**	**17.30**
Lead (Pb), µg	**0.54**	**1.94**	**1.24**
Lead (Pb), Mmdl, µg	0.011	0.011	0.011
Lead (Pb), If Mbhb exceeds 1, µg	No	No	
Lead (Pb), I. 1 µg	1	1	1
Lead (Pb), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Lead (Pb), II.b 5% of Mbh, µg	0.03	0.10	0.06
Lead (Pb), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Lead (Pb), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Lead (Pb), Mbhb - final, µg	0.00	0.00	0.00
Lead (Pb), Mbh - Mfhb, µg	0.54	1.94	1.24
Lead (Pb), Mbh, blank corrected final, µg	**0.54**	**1.94**	**1.24**
Manganese (Mn), µg	**0.89**	**8.96**	**4.93**
Manganese (Mn), Mmdl, µg	0.022	0.022	0.022
Manganese (Mn), If Mbhb exceeds 1, µg	No	No	
Manganese (Mn), I. 1 µg	1	1	1
Manganese (Mn), II.a Mbhb, µg (detected)	0.09	0.09	0.09
Manganese (Mn), II.b 5% of Mbh, µg	0.04	0.45	0.25
Manganese (Mn), II final - lesser of II(a) or II(b), µg	0.04	0.09	0.07
Manganese (Mn), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Manganese (Mn), Mbhb - final, µg	0.09	0.09	0.09
Manganese (Mn), Mbh - Mfhb, µg	0.80	8.87	4.83
Manganese (Mn), Mbh, blank corrected final, µg	**0.80**	**8.87**	**4.83**
Molybdenum (Mo), µg	**0.55**	**0.56**	**0.56**
Molybdenum (Mo), Mmdl, µg	0.553	0.560	0.557
Molybdenum (Mo), If Mbhb exceeds 1, µg	No	No	
Molybdenum (Mo), I. 1 µg	1	1	1
Molybdenum (Mo), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Molybdenum (Mo), II.b 5% of Mbh, µg	0.03	0.03	0.03
Molybdenum (Mo), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Molybdenum (Mo), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Molybdenum (Mo), Mbhb - final, µg	0.00	0.00	0.00
Molybdenum (Mo), Mbh - Mfhb, µg	0.55	0.56	0.56
Molybdenum (Mo), Mbh, blank corrected final, µg	**0.55**	**0.56**	**0.56**
Nickel (Ni), µg	**0.66**	**1.12**	**0.89**
Nickel (Ni), Mmdl, µg	0.062	0.063	0.062
Nickel (Ni), If Mbhb exceeds 1, µg	No	No	
Nickel (Ni), I. 1 µg	1	1	1
Nickel (Ni), II.a Mbhb, µg (detected)	0.10	0.10	0.10
Nickel (Ni), II.b 5% of Mbh, µg	0.03	0.06	0.04
Nickel (Ni), II final - lesser of II(a) or II(b), µg	0.03	0.06	0.04
Nickel (Ni), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Nickel (Ni), Mbhb - final, µg	0.10	0.10	0.10
Nickel (Ni), Mbh - Mfhb, µg	0.56	1.02	0.79
Nickel (Ni), Mbh, blank corrected final, µg	**0.56**	**1.02**	**0.79**
Phosphorus (P), µg	**3.18**	**2.44**	**2.81**
Phosphorus (P), Mmdl, µg	0.553	0.560	0.557
Phosphorus (P), If Mbhb exceeds 1, µg	Yes	Yes	
Phosphorus (P), I. 1 µg	1	1	1
Phosphorus (P), II.a Mbhb, µg (detected)	1.42	1.42	1.42
Phosphorus (P), II.b 5% of Mbh, µg	0.16	0.12	0.14
Phosphorus (P), II final - lesser of II(a) or II(b), µg	0.16	0.12	0.14
Phosphorus (P), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Phosphorus (P), Mbhb - final, µg	1.00	1.00	1.00
Phosphorus (P), Mbh - Mfhb, µg	2.18	1.44	1.81
Phosphorus (P), Mbh, blank corrected final, µg	**2.18**	**1.44**	**1.81**
Potassium (K), µg	**22.80**	**19.40**	**21.10**
Potassium (K), Mmdl, µg	5.530	5.600	5.565
Potassium (K), If Mbhb exceeds 1, µg	No	No	
Potassium (K), I. 1 µg	1	1	1
Potassium (K), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Potassium (K), II.b 5% of Mbh, µg	1.14	0.97	1.06
Potassium (K), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Potassium (K), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Potassium (K), Mbhb - final, µg	0.00	0.00	0.00
Potassium (K), Mbh - Mfhb, µg	22.80	19.40	21.10
Potassium (K), Mbh, blank corrected final, µg	**22.80**	**19.40**	**21.10**

Selenium (Se), µg	**0.12**	**0.06**	**0.09**
Selenium (Se), Mmdl, µg	0.055	0.056	0.056
Selenium (Se), If Mbhb exceeds 1, µg	No	No	
Selenium (Se), I. 1 µg	1	1	1
Selenium (Se), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Selenium (Se), II.b 5% of Mbh, µg	0.01	0.00	0.00
Selenium (Se), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Selenium (Se), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Selenium (Se), Mbhb - final, µg	0.00	0.00	0.00
Selenium (Se), Mbh - Mfhb, µg	0.12	0.06	0.09
Selenium (Se), Mbh, blank corrected final, µg	**0.12**	**0.06**	**0.09**
Silver (Ag), µg	**0.07**	**0.11**	**0.09**
Silver (Ag), Mmdl, µg	0.055	0.056	0.056
Silver (Ag), If Mbhb exceeds 1, µg	No	No	
Silver (Ag), I. 1 µg	1	1	1
Silver (Ag), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Silver (Ag), II.b 5% of Mbh, µg	0.00	0.01	0.00
Silver (Ag), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Silver (Ag), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Silver (Ag), Mbhb - final, µg	0.00	0.00	0.00
Silver (Ag), Mbh - Mfhb, µg	0.07	0.11	0.09
Silver (Ag), Mbh, blank corrected final, µg	**0.07**	**0.11**	**0.09**
Thallium (Tl), µg	**0.01**	**0.01**	**0.01**
Thallium (Tl), Mmdl, µg	0.011	0.011	0.011
Thallium (Tl), If Mbhb exceeds 1, µg	No	No	
Thallium (Tl), I. 1 µg	1	1	1
Thallium (Tl), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Thallium (Tl), II.b 5% of Mbh, µg	0.00	0.00	0.00
Thallium (Tl), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Thallium (Tl), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Thallium (Tl), Mbhb - final, µg	0.00	0.00	0.00
Thallium (Tl), Mbh - Mfhb, µg	0.01	0.01	0.01
Thallium (Tl), Mbh, blank corrected final, µg	**0.01**	**0.01**	**0.01**
Vanadium (V), µg	**1.11**	**1.12**	**1.12**
Vanadium (V), Mmdl, µg	1.110	1.120	1.115
Vanadium (V), If Mbhb exceeds 1, µg	No	No	
Vanadium (V), I. 1 µg	1	1	1
Vanadium (V), II.a Mbhb, µg (detected)	0.00	0.00	0.00
Vanadium (V), II.b 5% of Mbh, µg	0.06	0.06	0.06
Vanadium (V), II final - lesser of II(a) or II(b), µg	0.00	0.00	0.00
Vanadium (V), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Vanadium (V), Mbhb - final, µg	0.00	0.00	0.00
Vanadium (V), Mbh - Mfhb, µg	1.11	1.12	1.12
Vanadium (V), Mbh, blank corrected final, µg	**1.11**	**1.12**	**1.12**
Zinc (Zn), µg	**8.37**	**12.70**	**10.54**
Zinc (Zn), Mmdl, µg	0.487	0.493	0.490
Zinc (Zn), If Mbhb exceeds 1, µg	No	No	
Zinc (Zn), I. 1 µg	1	1	1
Zinc (Zn), II.a Mbhb, µg (detected)	0.10	0.10	0.10
Zinc (Zn), II.b 5% of Mbh, µg	0.42	0.64	0.53
Zinc (Zn), II final - lesser of II(a) or II(b), µg	0.10	0.10	0.10
Zinc (Zn), Mbhb - greater of I or II, µg	**1.00**	**1.00**	**1.00**
Zinc (Zn), Mbhb - final, µg	0.10	0.10	0.10
Zinc (Zn), Mbh - Mfhb, µg	8.27	12.60	10.44
Zinc (Zn), Mbh, blank corrected final, µg	**8.27**	**12.60**	**10.44**

RESULTS SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	0.000
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
O_2, % volume dry		13.43		14.38		13.91
CO_2, % volume dry		6.28		5.45		5.86
Stack Temperature, °F		222.7		231.4		227.0
Moisture Content, % by volume		13.95		11.75		12.85
Stack Flow Rate, dscfm		42,010		44,974		43,492
Standard Sample Volume, dscf		75.337		78.854		77.095
Aluminum (Al)						
mg/dscm	ADL	5.72E-03	ADL	5.15E-03	ADL	5.43E-03
mg/dscm @ 7% O_2	ADL	1.06E-02	ADL	1.10E-02	ADL	1.08E-02
lb/hr	ADL	8.99E-04	ADL	8.67E-04	ADL	8.83E-04
lb/1000 lb steam	ADL	1.53E-05	ADL	1.59E-05	ADL	1.56E-05
Antimony (Sb)						
mg/dscm	ND	2.59E-05	ADL	5.02E-05	DLL	3.80E-05
mg/dscm @ 7% O_2	ND	4.82E-05	ADL	1.07E-04	DLL	7.76E-05
lb/hr	ND	4.08E-06	ADL	8.44E-06	DLL	6.26E-06
lb/1000 lb steam	ND	6.92E-08	ADL	1.55E-07	DLL	1.12E-07
Arsenic (As)						
mg/dscm	ND	1.30E-04	ND	1.25E-04	ND	1.28E-04
mg/dscm @ 7% O_2	ND	2.42E-04	ND	2.67E-04	ND	2.54E-04
lb/hr	ND	2.04E-05	ND	2.11E-05	ND	2.08E-05
lb/1000 lb steam	ND	3.47E-07	ND	3.88E-07	ND	3.67E-07
Barium (Ba)						
mg/dscm	ADL	7.20E-04	ADL	6.61E-04	ADL	6.91E-04
mg/dscm @ 7% O_2	ADL	1.34E-03	ADL	1.41E-03	ADL	1.38E-03
lb/hr	ADL	1.13E-04	ADL	1.11E-04	ADL	1.12E-04
lb/1000 lb steam	ADL	1.92E-06	ADL	2.05E-06	ADL	1.98E-06
Beryllium (Be)						
mg/dscm	ND	5.20E-06	ND	5.02E-06	ND	5.11E-06
mg/dscm @ 7% O_2	ND	9.68E-06	ND	1.07E-05	ND	1.02E-05
lb/hr	ND	8.18E-07	ND	8.44E-07	ND	8.31E-07
lb/1000 lb steam	ND	1.39E-08	ND	1.55E-08	ND	1.47E-08
Cadmium (Cd)						
mg/dscm	ADL	3.47E-05	ADL	6.94E-05	ADL	5.21E-05
mg/dscm @ 7% O_2	ADL	6.46E-05	ADL	1.48E-04	ADL	1.06E-04
lb/hr	ADL	5.46E-06	ADL	1.17E-05	ADL	8.57E-06
lb/1000 lb steam	ADL	9.27E-08	ADL	2.15E-07	ADL	1.54E-07
Chromium (Cr)						
mg/dscm	ADL	2.25E-04	ADL	1.89E-04	ADL	2.07E-04
mg/dscm @ 7% O_2	ADL	4.19E-04	ADL	4.03E-04	ADL	4.11E-04
lb/hr	ADL	3.54E-05	ADL	3.18E-05	ADL	3.36E-05
lb/1000 lb steam	ADL	6.02E-07	ADL	5.85E-07	ADL	5.93E-07
Cobalt (Co)						
mg/dscm	ND	2.59E-05	ADL	3.13E-05	DLL	2.86E-05
mg/dscm @ 7% O_2	ND	4.82E-05	ADL	6.68E-05	DLL	5.75E-05
lb/hr	ND	4.08E-06	ADL	5.28E-06	DLL	4.68E-06
lb/1000 lb steam	ND	6.92E-08	ADL	9.70E-08	DLL	8.31E-08
Copper (Cu)						
mg/dscm	ADL	3.99E-04	ADL	3.63E-04	ADL	3.81E-04
mg/dscm @ 7% O_2	ADL	7.42E-04	ADL	7.73E-04	ADL	7.58E-04
lb/hr	ADL	6.27E-05	ADL	6.11E-05	ADL	6.19E-05
lb/1000 lb steam	ADL	1.06E-06	ADL	1.12E-06	ADL	1.09E-06
Iron (Fe)						
mg/dscm	ADL	8.30E-03	ADL	7.57E-03	ADL	7.93E-03
mg/dscm @ 7% O_2	ADL	1.54E-02	ADL	1.61E-02	ADL	1.58E-02
lb/hr	ADL	1.30E-03	ADL	1.27E-03	ADL	1.29E-03
lb/1000 lb steam	ADL	2.21E-05	ADL	2.34E-05	ADL	2.28E-05
Lead (Pb)						
mg/dscm	ADL	2.52E-04	ADL	8.69E-04	ADL	5.60E-04
mg/dscm @ 7% O_2	ADL	4.68E-04	ADL	1.85E-03	ADL	1.16E-03
lb/hr	ADL	3.96E-05	ADL	1.46E-04	ADL	9.29E-05
lb/1000 lb steam	ADL	6.72E-07	ADL	2.69E-06	ADL	1.68E-06
Manganese (Mn)						
mg/dscm	ADL	3.75E-04	ADL	3.97E-03	ADL	2.17E-03
mg/dscm @ 7% O_2	ADL	6.98E-04	ADL	8.46E-03	ADL	4.58E-03
lb/hr	ADL	5.90E-05	ADL	6.68E-04	ADL	3.64E-04
lb/1000 lb steam	ADL	1.00E-06	ADL	1.23E-05	ADL	6.64E-06

RESULTS SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	0.000
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
O_2, % volume dry		13.43		14.38		13.91
CO_2, % volume dry		6.28		5.45		5.86
Stack Temperature, °F		222.7		231.4		227.0
Moisture Content, % by volume		13.95		11.75		12.85
Stack Flow Rate, dscfm		42,010		44,974		43,492
Standard Sample Volume, dscf		75.337		78.854		77.095
Molybdenum (Mo)						
mg/dscm	ND	2.59E-04	ND	2.51E-04	ND	2.55E-04
mg/dscm @ 7% O_2	ND	4.82E-04	ND	5.35E-04	ND	5.08E-04
lb/hr	ND	4.08E-05	ND	4.22E-05	ND	4.15E-05
lb/1000 lb steam	ND	6.92E-07	ND	7.76E-07	ND	7.34E-07
Nickel (Ni)						
mg/dscm	ADL	2.63E-04	ADL	4.56E-04	ADL	3.60E-04
mg/dscm @ 7% O_2	ADL	4.89E-04	ADL	9.73E-04	ADL	7.31E-04
lb/hr	ADL	4.13E-05	ADL	7.68E-05	ADL	5.91E-05
lb/1000 lb steam	ADL	7.02E-07	ADL	1.41E-06	ADL	1.06E-06
Phosphorus (P)						
mg/dscm	ADL	1.02E-03	ADL	6.45E-04	ADL	8.33E-04
mg/dscm @ 7% O_2	ADL	1.90E-03	ADL	1.37E-03	ADL	1.64E-03
lb/hr	ADL	1.61E-04	ADL	1.09E-04	ADL	1.35E-04
lb/1000 lb steam	ADL	2.73E-06	ADL	2.00E-06	ADL	2.36E-06
Potassium (K)						
mg/dscm	ADL	1.07E-02	ADL	8.69E-03	ADL	9.69E-03
mg/dscm @ 7% O_2	ADL	1.99E-02	ADL	1.85E-02	ADL	1.92E-02
lb/hr	ADL	1.68E-03	ADL	1.46E-03	ADL	1.57E-03
lb/1000 lb steam	ADL	2.85E-05	ADL	2.69E-05	ADL	2.77E-05
Selenium (Se)						
mg/dscm	ADL	5.58E-05	ADL	2.78E-05	ADL	4.18E-05
mg/dscm @ 7% O_2	ADL	1.04E-04	ADL	5.92E-05	ADL	8.15E-05
lb/hr	ADL	8.77E-06	ADL	4.67E-06	ADL	6.72E-06
lb/1000 lb steam	ADL	1.49E-07	ADL	8.59E-08	ADL	1.17E-07
Silver (Ag)						
mg/dscm	ADL	3.49E-05	ADL	4.70E-05	ADL	4.10E-05
mg/dscm @ 7% O_2	ADL	6.50E-05	ADL	1.00E-04	ADL	8.26E-05
lb/hr	ADL	5.49E-06	ADL	7.91E-06	ADL	6.70E-06
lb/1000 lb steam	ADL	9.32E-08	ADL	1.45E-07	ADL	1.19E-07
Thallium (Tl)						
mg/dscm	ND	5.20E-06	ND	5.02E-06	ND	5.11E-06
mg/dscm @ 7% O_2	ND	9.68E-06	ND	1.07E-05	ND	1.02E-05
lb/hr	ND	8.18E-07	ND	8.44E-07	ND	8.31E-07
lb/1000 lb steam	ND	1.39E-08	ND	1.55E-08	ND	1.47E-08
Vanadium (V)						
mg/dscm	ND	5.20E-04	ND	5.02E-04	ND	5.11E-04
mg/dscm @ 7% O_2	ND	9.68E-04	ND	1.07E-03	ND	1.02E-03
lb/hr	ND	8.18E-05	ND	8.44E-05	ND	8.31E-05
lb/1000 lb steam	ND	1.39E-06	ND	1.55E-06	ND	1.47E-06
Zinc (Zn)						
mg/dscm	ADL	3.88E-03	ADL	5.64E-03	ADL	4.76E-03
mg/dscm @ 7% O_2	ADL	7.21E-03	ADL	1.20E-02	ADL	9.62E-03
lb/hr	ADL	6.10E-04	ADL	9.50E-04	ADL	7.80E-04
lb/1000 lb steam	ADL	1.04E-05	ADL	1.75E-05	ADL	1.39E-05

LAB DATA SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
Aluminum (Al) fh blank corrected, µg	ADL	141.20	ADL	100.20	ADL	120.70
Aluminum (Al) bh blank corrected, µg	ADL	12.20	ADL	11.50	ADL	11.85
Aluminum (Al) total, µg	ADL	153.40	ADL	111.70	ADL	132.55
Antimony (Sb), fh blank corrected, µg	ADL	0.27	ADL	0.55	ADL	0.41
Antimony (Sb) bh blank corrected, µg	ND	0.06	ADL	0.11	DLL	0.08
Antimony (Sb) total, µg	DLL	0.33	ADL	0.66	DLL	0.49
Arsenic (As), fh blank corrected, µg	ADL	0.25	ADL	0.44	ADL	0.35
Arsenic (As) bh blank corrected, µg	ND	0.28	ND	0.28	ND	0.28
Arsenic (As) total, µg	DLL	0.53	DLL	0.72	DLL	0.62
Barium (Ba), fh blank corrected, µg	ADL	0.46	ADL	0.46	ADL	0.46
Barium (Ba) bh blank corrected, µg	ADL	1.54	ADL	1.48	ADL	1.51
Barium (Ba) total, µg	ADL	1.99	ADL	1.93	ADL	1.96
Beryllium (Be), fh blank corrected, µg	ND	0.05	ND	0.05	ND	0.05
Beryllium (Be) bh blank corrected, µg	ND	0.01	ND	0.01	ND	0.01
Beryllium (Be) total, µg	ND	0.06	ND	0.06	ND	0.06
Cadmium (Cd), fh blank corrected, µg	ADL	1.24	ADL	0.16	ADL	0.70
Cadmium (Cd) bh blank corrected, µg	ADL	0.07	ADL	0.16	ADL	0.11
Cadmium (Cd) total, µg	ADL	1.32	ADL	0.31	ADL	0.82
Chromium (Cr), fh blank corrected, µg	ADL	8.74	ADL	6.76	ADL	7.75
Chromium (Cr) bh blank corrected, µg	ADL	0.48	ADL	0.42	ADL	0.45
Chromium (Cr) total, µg	ADL	9.22	ADL	7.18	ADL	8.20
Cobalt (Co), fh blank corrected, µg	ADL	0.22	ADL	0.18	ADL	0.20
Cobalt (Co) bh blank corrected, µg	ND	0.06	ADL	0.07	DLL	0.06
Cobalt (Co) total, µg	DLL	0.27	ADL	0.25	DLL	0.26
Copper (Cu), fh blank corrected, µg	ADL	0.83	ADL	1.58	ADL	1.20
Copper (Cu) bh blank corrected, µg	ADL	0.85	ADL	0.81	ADL	0.83
Copper (Cu) total, µg	ADL	1.68	ADL	2.39	ADL	2.03
Iron (Fe), fh blank corrected, µg	ADL	361.95	ADL	282.15	ADL	322.05
Iron (Fe) bh blank corrected, µg	ADL	17.70	ADL	16.90	ADL	17.30
Iron (Fe) total, µg	ADL	379.65	ADL	299.05	ADL	339.35
Lead (Pb), fh blank corrected, µg	ADL	0.61	ADL	0.81	ADL	0.71
Lead (Pb) bh blank corrected, µg	ADL	0.54	ADL	1.94	ADL	1.24
Lead (Pb) total, µg	ADL	1.15	ADL	2.75	ADL	1.95
Manganese (Mn), fh blank corrected, µg	ADL	4.20	ADL	7.02	ADL	5.61
Manganese (Mn) bh blank corrected, µg	ADL	0.80	ADL	8.87	ADL	4.83
Manganese (Mn) total, µg	ADL	5.00	ADL	15.89	ADL	10.44
Mercury (Hg), total blank corrected, µg	DLL	1.81	DLL	2.57	DLL	2.19
Molybdenum (Mo), fh blank corrected, µg	ADL	2.50	ADL	2.50	ADL	2.50
Molybdenum (Mo) bh blank corrected, µg	ND	0.55	ND	0.56	ND	0.56
Molybdenum (Mo) total, µg	DLL	3.05	DLL	3.06	DLL	3.06
Nickel (Ni), fh blank corrected, µg	ADL	5.07	ADL	3.31	ADL	4.19
Nickel (Ni) bh blank corrected, µg	ADL	0.56	ADL	1.02	ADL	0.79
Nickel (Ni) total, µg	ADL	5.63	ADL	4.33	ADL	4.98
Phosphorus (P), fh blank corrected, µg	ADL	3.36	ADL	2.54	ADL	2.95
Phosphorus (P) bh blank corrected, µg	ADL	2.18	ADL	1.44	ADL	1.81
Phosphorus (P) total, µg	ADL	5.54	ADL	3.98	ADL	4.76
Potassium (K), fh blank corrected, µg	ADL	56.20	ADL	52.90	ADL	54.55
Potassium (K) bh blank corrected, µg	ADL	22.80	ADL	19.40	ADL	21.10
Potassium (K) total, µg	ADL	79.00	ADL	72.30	ADL	75.65
Selenium (Se), fh blank corrected, µg	ND	0.25	ND	0.25	ND	0.25
Selenium (Se) bh blank corrected, µg	ADL	0.12	ADL	0.06	ADL	0.09
Selenium (Se) total, µg	DLL	0.37	DLL	0.31	DLL	0.34
Silver (Ag), fh blank corrected, µg	ADL	0.15	ADL	0.05	ADL	0.10
Silver (Ag) bh blank corrected, µg	ADL	0.07	ADL	0.11	ADL	0.09
Silver (Ag) total, µg	ADL	0.23	ADL	0.15	ADL	0.19

Thallium (Tl), fh blank corrected, µg	ND	0.10	ND	0.10	ND	0.10
Thallium (Tl) bh blank corrected, µg	ND	0.01	ND	0.01	ND	0.01
Thallium (Tl) total, µg	ND	0.11	ND	0.11	ND	0.11
Vanadium (V), fh blank corrected, µg	ND	5.00	ND	5.00	ND	5.00
Vanadium (V) bh blank corrected, µg	ND	1.11	ND	1.12	ND	1.12
Vanadium (V) total, µg	ND	6.11	ND	6.12	ND	6.12
Zinc (Zn), fh blank corrected, µg	ADL	13.86	ADL	10.26	ADL	12.06
Zinc (Zn) bh blank corrected, µg	ADL	8.27	ADL	12.60	ADL	10.44
Zinc (Zn) total, µg	ADL	22.13	ADL	22.86	ADL	22.50

RESULTS SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
$O_{2,}$ % volume dry		13.43		14.38		13.91
$CO_{2,}$ % volume dry		6.28		5.45		5.86
Stack Temperature, °F		222.7		231.4		227.04
Moisture Content, % by volume		13.95		11.75		12.85
Stack Flow Rate, dscfm		42,010		44,974		43492.37
Standard Sample Volume, dscf		75.337		78.854		77.10
Aluminum (Al)						
mg/dscm	ADL	0.072	ADL	0.050	ADL	0.061
mg/dscm @ 7% O_2	ADL	0.13	ADL	0.11	ADL	0.12
lb/hr	ADL	1.13E-02	ADL	8.42E-03	ADL	9.86E-03
lb/1000 lb steam	ADL	1.92E-04	ADL	1.55E-04	ADL	1.73E-04
Antimony (Sb)						
mg/dscm	DLL	1.53E-04	ADL	2.96E-04	DLL	2.25E-04
mg/dscm @ 7% O_2	DLL	2.85E-04	ADL	6.31E-04	DLL	4.58E-04
lb/hr	DLL	2.41E-05	ADL	4.98E-05	DLL	3.70E-05
lb/1000 lb steam	DLL	4.10E-07	ADL	9.16E-07	DLL	6.63E-07
Arsenic (As)						
mg/dscm	DLL	2.47E-04	DLL	3.22E-04	DLL	2.85E-04
mg/dscm @ 7% O_2	DLL	4.60E-04	DLL	6.87E-04	DLL	5.73E-04
lb/hr	DLL	3.88E-05	DLL	5.43E-05	DLL	4.66E-05
lb/1000 lb steam	DLL	6.59E-07	DLL	9.98E-07	DLL	8.29E-07
Barium (Ba)						
mg/dscm	ADL	9.34E-04	ADL	8.65E-04	ADL	8.99E-04
mg/dscm @ 7% O_2	ADL	1.74E-03	ADL	1.84E-03	ADL	1.79E-03
lb/hr	ADL	1.47E-04	ADL	1.46E-04	ADL	1.46E-04
lb/1000 lb steam	ADL	2.49E-06	ADL	2.68E-06	ADL	2.58E-06
Beryllium (Be)						
mg/dscm	ND	2.86E-05	ND	2.74E-05	ND	2.80E-05
mg/dscm @ 7% O_2	ND	5.33E-05	ND	5.84E-05	ND	5.59E-05
lb/hr	ND	4.50E-06	ND	4.61E-06	ND	4.56E-06
lb/1000 lb steam	ND	7.64E-08	ND	8.48E-08	ND	8.06E-08
Cadmium (Cd)						
mg/dscm	ADL	6.18E-04	ADL	1.40E-04	ADL	3.79E-04
mg/dscm @ 7% O_2	ADL	1.15E-03	ADL	2.99E-04	ADL	7.24E-04
lb/hr	ADL	9.71E-05	ADL	2.36E-05	ADL	6.04E-05
lb/1000 lb steam	ADL	1.65E-06	ADL	4.34E-07	ADL	1.04E-06
Chromium (Cr)						
mg/dscm	ADL	4.32E-03	ADL	3.22E-03	ADL	3.77E-03
mg/dscm @ 7% O_2	ADL	8.04E-03	ADL	6.86E-03	ADL	7.45E-03
lb/hr	ADL	6.80E-04	ADL	5.41E-04	ADL	6.10E-04
lb/1000 lb steam	ADL	1.15E-05	ADL	9.95E-06	ADL	1.07E-05
Cobalt (Co)						
mg/dscm	DLL	1.28E-04	ADL	1.11E-04	DLL	1.20E-04
mg/dscm @ 7% O_2	DLL	2.38E-04	ADL	2.37E-04	DLL	2.38E-04
lb/hr	DLL	2.01E-05	ADL	1.87E-05	DLL	1.94E-05
lb/1000 lb steam	DLL	3.42E-07	ADL	3.44E-07	DLL	3.43E-07
Copper (Cu)						
mg/dscm	ADL	7.86E-04	ADL	1.07E-03	ADL	9.28E-04
mg/dscm @ 7% O_2	ADL	1.46E-03	ADL	2.28E-03	ADL	1.87E-03
lb/hr	ADL	1.24E-04	ADL	1.80E-04	ADL	1.52E-04
lb/1000 lb steam	ADL	2.10E-06	ADL	3.31E-06	ADL	2.70E-06
Iron (Fe)						
mg/dscm	ADL	1.78E-01	ADL	1.34E-01	ADL	1.56E-01
mg/dscm @ 7% O_2	ADL	3.31E-01	ADL	2.85E-01	ADL	3.08E-01
lb/hr	ADL	2.80E-02	ADL	2.25E-02	ADL	2.53E-02
lb/1000 lb steam	ADL	4.75E-04	ADL	4.14E-04	ADL	4.45E-04
Lead (Pb)						
mg/dscm	ADL	5.39E-04	ADL	1.23E-03	ADL	8.85E-04
mg/dscm @ 7% O_2	ADL	1.00E-03	ADL	2.62E-03	ADL	1.81E-03
lb/hr	ADL	8.48E-05	ADL	2.07E-04	ADL	1.46E-04
lb/1000 lb steam	ADL	1.44E-06	ADL	3.81E-06	ADL	2.62E-06
Manganese (Mn)						
mg/dscm	ADL	2.34E-03	ADL	7.11E-03	ADL	4.73E-03
mg/dscm @ 7% O_2	ADL	4.36E-03	ADL	1.52E-02	ADL	9.76E-03
lb/hr	ADL	3.68E-04	ADL	1.20E-03	ADL	7.83E-04
lb/1000 lb steam	ADL	6.25E-06	ADL	2.20E-05	ADL	1.41E-05

RESULTS SUMMARY

Method	EPA 29
Project No.	010935A
Client	Covanta Marion
Unit / Location	Unit 1
Duct area, ft^2	12.566
Reference temperature, °F	68

Test number		Run 1		Run 2		Average
Date		12/7/21		12/7/21		--
Start / Stop time		1337-1545		1605-1812		--
O_2, % volume dry		13.43		14.38		13.91
CO_2, % volume dry		6.28		5.45		5.86
Stack Temperature, °F		222.7		231.4		227.04
Moisture Content, % by volume		13.95		11.75		12.85
Stack Flow Rate, dscfm		42,010		44,974		43492.37
Standard Sample Volume, dscf		75.337		78.854		77.10
Mercury (Hg)						
mg/dscm	DLL	8.49E-04	DLL	1.15E-03	DLL	9.99E-04
mg/dscm @ 7% O_2	DLL	1.58E-03	DLL	2.45E-03	DLL	2.01E-03
lb/hr	DLL	1.33E-04	DLL	1.93E-04	DLL	1.63E-04
lb/1000 lb steam	DLL	2.27E-06	DLL	3.56E-06	DLL	2.91E-06
Molybdenum (Mo)						
mg/dscm	DLL	1.43E-03	DLL	1.37E-03	DLL	1.40E-03
mg/dscm @ 7% O_2	DLL	2.66E-03	DLL	2.92E-03	DLL	2.79E-03
lb/hr	DLL	2.25E-04	DLL	2.31E-04	DLL	2.28E-04
lb/MMBtu	DLL	3.82E-06	DLL	4.24E-06	DLL	4.03E-06
Nickel (Ni)						
mg/dscm	ADL	2.64E-03	ADL	1.94E-03	ADL	2.29E-03
mg/dscm @ 7% O_2	ADL	4.91E-03	ADL	4.13E-03	ADL	4.52E-03
lb/hr	ADL	4.15E-04	ADL	3.26E-04	ADL	3.71E-04
lb/1000 lb steam	ADL	7.05E-06	ADL	6.00E-06	ADL	6.52E-06
Phosphorus (P)						
mg/dscm	ADL	2.60E-03	ADL	1.78E-03	ADL	2.19E-03
mg/dscm @ 7% O_2	ADL	4.83E-03	ADL	3.80E-03	ADL	4.32E-03
lb/hr	ADL	4.08E-04	ADL	3.00E-04	ADL	3.54E-04
lb/1000 lb steam	ADL	6.93E-06	ADL	5.51E-06	ADL	6.22E-06
Potassium (K)						
mg/dscm	ADL	3.70E-02	ADL	3.24E-02	ADL	3.47E-02
mg/dscm @ 7% O_2	ADL	6.89E-02	ADL	6.90E-02	ADL	6.90E-02
lb/hr	ADL	5.82E-03	ADL	5.45E-03	ADL	5.64E-03
lb/1000 lb steam	ADL	9.88E-05	ADL	1.00E-04	ADL	9.95E-05
Selenium (Se)						
mg/dscm	DLL	1.73E-04	DLL	1.40E-04	DLL	1.56E-04
mg/dscm @ 7% O_2	DLL	3.22E-04	DLL	2.98E-04	DLL	3.10E-04
lb/hr	DLL	2.72E-05	DLL	2.35E-05	DLL	2.54E-05
lb/1000 lb steam	DLL	4.62E-07	DLL	4.32E-07	DLL	4.47E-07
Silver (Ag)						
mg/dscm	ADL	1.06E-04	ADL	6.87E-05	ADL	8.72E-05
mg/dscm @ 7% O_2	ADL	1.97E-04	ADL	1.46E-04	ADL	1.72E-04
lb/hr	ADL	1.66E-05	ADL	1.16E-05	ADL	1.41E-05
lb/1000 lb steam	ADL	2.82E-07	ADL	2.13E-07	ADL	2.47E-07
Thallium (Tl)						
mg/dscm	ND	5.21E-05	ND	4.98E-05	ND	5.09E-05
mg/dscm @ 7% O_2	ND	9.69E-05	ND	1.06E-04	ND	1.02E-04
lb/hr	ND	8.19E-06	ND	8.38E-06	ND	8.28E-06
lb/1000 lb steam	ND	1.39E-07	ND	1.54E-07	ND	1.47E-07
Vanadium (V)						
mg/dscm	ND	2.86E-03	ND	2.74E-03	ND	2.80E-03
mg/dscm @ 7% O_2	ND	5.33E-03	ND	5.84E-03	ND	5.59E-03
lb/hr	ND	4.50E-04	ND	4.61E-04	ND	4.56E-04
lb/1000 lb steam	ND	7.64E-06	ND	8.48E-06	ND	8.06E-06
Zinc (Zn)						
mg/dscm	ADL	1.04E-02	ADL	1.02E-02	ADL	1.03E-02
mg/dscm @ 7% O_2	ADL	1.93E-02	ADL	2.18E-02	ADL	2.06E-02
lb/hr	ADL	1.63E-03	ADL	1.72E-03	ADL	1.68E-03
lb/1000 lb steam	ADL	2.77E-05	ADL	3.17E-05	ADL	2.97E-05

Appendix A.7
Example Calculations

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name:	Covanta Marion	**Project number:**	006AS-010935
Computed by:	A Vella	**Calculation date:**	2022-01-14
Run number:	HCl Run 1		

SAMPLE TRAIN DATA

Meter calibration factor, Y_d	1.0236	Y
Stack area, square feet	12.566	A_s
Pitot Coefficient	0.84	C_p
Barometric pressure, in. Hg	29.72	P_{bar}
Meter box volume, acf	43.288	V_m
Impinger liquid volume, g	143.8	V_{lc}
Meter temperature, °R	532.9	T_m = (°F plus 460)
Meter pressure, (delta H) iwg	1.6	ΔH
Velocity head, (delta P) iwg	1.5955	ΔP
Static pressure, iwg	-0.78	P_{sg}
Stack temperature, °R	680.8	T_s = (°F plus 460)
Stack O_2, % volume dry	13.43	O_2
Stack CO_2, % volume dry	6.28	CO_2
Stack N_2, % volume dry	80.29	$N_2 = (100 - \%O_2 - \%CO_2)$
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

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

$$V_{m\,std} = \frac{17.64\times(43.288)(1.0236)[29.72+(1.6)/(13.6)]}{532.9}$$

$V_{m\,std}$ = 43.764 dscf

b. Water vapor volume, scf

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

$$V_{w\,std} = \frac{(0.04715)(143.8)(528)}{(528)}$$

$V_{w\,std}$ = 6.780 scf

c. Moisture content, non-dimensional

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

$$B_{ws} = \frac{(6.78)}{(43.764 + 6.78)}$$

B_{ws} = 0.1341 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(6.28)] + [0.32(13.43)] + [0.28(80.29)]

MW_{dry} = 29.542 lb/lb mole

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

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

MW_{wet} = [29.542(1-0.1341)] + [18(0.1341)]

MW_{wet} = 27.994 lb/lb mole

f. Absolute stack pressure, in Hg

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

P_s = 29.72 + (-0.78/13.6)

P_s = 29.663 in. Hg

g. Stack velocity, ft/sec

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

$$v_s = (85.49)(0.84)\sqrt{\frac{(1.5955)(680.8)}{(29.663)(27.994)}}$$

v_s = 82.132 ft/sec

h. **Actual stack flow rate, acfm**

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

Q = (82.132)(12.566)(60)

Q = 61,924 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} = (82.132)(12.566)(60)(528/680.8)(29.663/29.92)

Q_{ws} = 47,613 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} = (82.132)(12.566)(60)(1-0.1341)(528/680.8)(29.663/29.92)

Q_{ds} = 41,228 dscfm

MONTROSE
AIR QUALITY SERVICES

EXAMPLE CALCULATIONS
HYDROGEN CHLORIDE

Project name: Covanta Marion
Project number: 006AS-010935
Computed by: A Vella
Calculation date: 2022-01-14
Run number: 1

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured compound in sample, mg/sample	6.502	F_t
Dry meter volume at standard conditions, dscf	43.780	$V_{m\ std}$
Dry stack gas flow rate at standard conditions, dscfm	41,231	Q_{ds}
Stack O_2, % volume dry	13.43	O_2
Steam rate, 1000 lb/hr	61.0	S
Molecular weight of gaseous species, lb/lb-mol	36.46	MW_S, where
36.46 for HCl		
Conversion factor from ppm to lb/scf	9.46E-08	CF where
9.462E-08 for HCl		

1 HCl

a. Concentration, ppm

$$C = \left(\frac{F_t}{V_{m\,std}}\right)\left(\frac{T_{ref}}{520}\right)\left(\frac{1g}{10^3\,mg}\right)\left(\frac{1\,lb}{454\,g}\right)\left(\frac{379.5\,dscf}{lb\cdot mol}\right)\left(\frac{lb\cdot mol}{MW\,g/mol}\right)10^6$$

$$C = \frac{(6.502 \times 528 \times 379.5 \times 1{,}000{,}000)}{(43.78 \times 520 \times 1000 \times 454 \times 36.46)}$$

C = 3.457 ppm

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. **Concentration, ppm @ 7% O_2**

$$C_7 = C\,\frac{(20.9-7)}{(20.9-\%O_2)}$$

$$C_7 = 3.46 \times \frac{(20.9 - 7)}{(20.9 - 13.43)}$$

C_7 = 6.43 ppm @ 7% O_2

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

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

M = (3.457)(9.46E-08)(41,231)(60)

M = 0.809 lb/hr

d. **Mass emission rate, lb/1000 lb steam**

$$M' = \frac{M}{S}$$

$$M' = \frac{0.809}{61.0}$$

M' = 0.0133 lb/1000 lb steam

EXAMPLE CALCULATIONS
MERCURY EMISSIONS

Project name: Covanta Marion
Computed by: A Vella
Run number: 1
Project number: 006AS-010935
Calculation date: 2022-01-14
Gaseous Species: Mercury (Hg)

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Mass of measured compound in sample, µg/sample	1.810	m
Standard volume of gas sampled, dscf	75.337	V_{mstd}
Dry stack gas flow rate at standard conditions, dscfm	42,010	Q_{ds}
Stack O_2, % volume dry	13.43	O_2
Steam rate, 1000 lb/hr	58.9	S

1 GASEOUS EMISSIONS

a. Concentration, mg/dscm

$$C = \frac{(m)}{(V_{mstd})} \times \frac{1\,mg}{1000\,\mu g} \times \frac{35.315\,ft^3}{1\,m^3}$$

$$C = \frac{(1.81)(35.315)}{(75.337)(1000)}$$

C = 8.48E-04 mg/dscm

b. Concentration, mg/dscm @ 7% O_2

$$C_7 = C \times \frac{(20.9-7)}{(20.9-\%O_2)}$$

$$C_7 = \frac{(0.000848)(20.9\text{-}7)}{(20.9 - 13.43)}$$

C_7 = 1.58E-03 mg/dscm @ 7% O_2

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.

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

$$M = C \times \frac{1\,m^3}{35.31\,ft^3} \times Q_{ds} \times \frac{60\,min}{1\,hr} \times \frac{1\,g}{10^3\,mg} \times \frac{1\,lb}{454\,g}$$

M = $\frac{(0.000848)(42{,}010)(60)}{(35.31)(1{,}000)(454)}$

M = 1.33E-04 lb/hr

d. **Mass emission rate, lb/1000 lb steam**

$$M' = \frac{M}{S}$$

M' = $\frac{1.33E\text{-}04}{58.9}$

M' = 2.26E-06 lb/1000 lb steam

Appendix A.8
General Equations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

   a. Standard sample gas volume, dscf

   $$V_{m\,std} = 17.636 \times (V_m)(Y)\frac{\left(P_{bar} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)}$$

   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)

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

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

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

   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 (πr^2), where $\pi = 3.1416$ and r = radius (½ diameter) in inches

A_s = stack area, ft^2 (πr^2), where $\pi = 3.1416$ 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

$\mathrm{G_m}$ = 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

Data Summary Report

HCl Run 1

Company: Covanta Marion, Inc.
P.O. Box 9126
Salem, OR 97305
Source: Unit #1
Data Group: All Data Groups
Report Name: ! Stack Test - Op & CEM Data - U1-pk
Start of Report: 12/07/2021 13:37 End of Report: 12/07/2021 14:37 Validation: Valid Data Only

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 13:37	61.5	293	9.40	255.7	1.0	11	175	47	0	7.7	13.2	0.2
12/07/2021 13:38	60.2	292	9.05	253.3	0.9	10	180	52	0	7.5	12.9	0.2
12/07/2021 13:39	59.9	292	9.39	251.1	0.8	10	176	47	0	7.5	12.9	0.2
12/07/2021 13:40	60.4	292	9.62	251.8	0.8	11	179	44	0	7.8	13.0	0.2
12/07/2021 13:41	59.2	292	9.29	251.6	0.9	11	178	40	0	8.2	13.2	0.2
12/07/2021 13:42	59.4	292	9.17	250.2	0.8	9	179	37	0	7.9	13.3	0.2
12/07/2021 13:43	59.8	292	9.66	250.4	0.8	11	178	39	0	7.3	13.1	0.2
12/07/2021 13:44	59.9	292	9.72	250.6	0.9	9	168	41	0	7.1	12.8	0.2
12/07/2021 13:45	60.4	291	8.93	250.6	0.1	10	157	41	0	7.2	12.8	0.2
12/07/2021 13:46	61.0	291	9.49	249.5	0.0	10	165	45	0	7.0	12.7	0.2
12/07/2021 13:47	61.3	291	9.60	251.7	0.0	10	178	44	0	7.4	12.7	0.2
12/07/2021 13:48	61.9	291	9.33	252.8	0.0	9	183	43	0	7.3	13.0	0.2
12/07/2021 13:49	62.3	290	9.50	251.1	0.0	10	169	49	0	7.2	12.7	0.2
12/07/2021 13:50	61.8	290	9.05	252.3	0.0	9	180	45	0	7.5	12.9	0.2
12/07/2021 13:51	61.3	290	9.72	252.7	0.0	11	183	45	0	7.8	13.0	0.2
12/07/2021 13:52	60.6	289	9.58	255.5	0.0	10	175	43	0	7.2	13.0	0.2
12/07/2021 13:53	59.1	289	9.36	254.9	0.0	12	173	42	0	7.9	12.9	0.2
12/07/2021 13:54	59.6	289	9.43	255.2	0.0	11	181	37	0	7.6	13.2	0.2
12/07/2021 13:55	60.8	289	9.28	257.4	0.0	10	177	43	0	7.2	12.9	0.2
12/07/2021 13:56	61.6	288	9.47	256.2	0.0	12	186	41	0	7.6	12.8	0.2
12/07/2021 13:57	61.8	288	9.28	255.6	0.1	11	187	37	0	7.4	13.0	0.2
12/07/2021 13:58	62.0	288	9.47	256.9	0.2	10	180	38	0	7.0	12.8	0.2
12/07/2021 13:59	61.8	288	9.26	260.1	0.1	10	181	40	0	7.2	12.7	0.2
12/07/2021 14:00	61.6	288	9.66	259.4	0.0	9	189	39	0	7.5	12.8	0.2
12/07/2021 14:01	61.8	287	9.28	258.3	0.5	9	190	38	0	7.3	12.9	0.2
12/07/2021 14:02	61.8	287	9.32	258.3	0.5	10	177	41	0	7.0	12.7	0.2
12/07/2021 14:03	61.3	287	9.48	252.7	0.7	14	173	39	0	7.5	12.8	0.2
12/07/2021 14:04	61.2	287	9.43	255.5	0.4	11	183	34	0	8.0	13.1	0.2
12/07/2021 14:05	61.7	287	9.39	257.2	1.0	11	176	36	0	6.9	13.0	0.2
12/07/2021 14:06	62.4	287	9.42	260.3	0.0	10	191	36	0	7.0	12.6	0.2
12/07/2021 14:07	63.7	287	9.21	264.8	0.3	8	197	36	0	6.8	12.6	0.2
12/07/2021 14:08	63.8	287	9.40	256.8	3.8	8	190	38	0	7.6	12.7	0.2

Date/Time Printed: 12/07/2021 17:21

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 14:09	63.6	287	8.48	255.7	3.0	7	198	35	0	7.7	13.1	0.2
12/07/2021 14:10	63.4	287	13.59	254.4	0.0	10	190	36	0	7.4	12.9	0.2
12/07/2021 14:11	62.7	286	9.20	255.5	3.1	9	195	35	0	7.4	12.9	0.2
12/07/2021 14:12	61.9	286	9.72	254.8	0.7	9	188	36	0	7.4	12.9	0.2
12/07/2021 14:13	61.3	286	9.21	252.8	1.0	9	192	33	0	7.9	13.0	0.2
12/07/2021 14:14	61.3	286	9.45	255.0	0.4	11	189	32	0	7.3	13.1	0.2
12/07/2021 14:15	60.4	286	9.38	254.5	0.9	10	183		0		12.8	0.2
12/07/2021 14:16	60.1	286	9.45	254.4	2.2	9	189		0		13.3	0.2
12/07/2021 14:17	59.7	286	9.48	253.1	2.4	11	174	37	0	7.1<	13.0	0.2
12/07/2021 14:18	59.9	286	9.25	256.7	2.1	9	154	36	0	7.6	12.9	0.2
12/07/2021 14:19	60.3	286	9.77	252.8	1.7	9	148	36	0	7.3	13.0	0.2
12/07/2021 14:20	59.8	286	9.03	250.6	1.1	10	149	39	0	7.4	12.9	0.2
12/07/2021 14:21	60.0	286	9.48	251.7	0.7	10	158	37	0	7.4	12.9	0.2
12/07/2021 14:22	60.7	287	9.68	256.4	0.5	10	164	37	0	7.3	12.9	0.2
12/07/2021 14:23	61.6	287	9.20	255.2	0.4	9	179	38	0	7.5	12.9	0.2
12/07/2021 14:24	60.9	287	9.51	254.2	0.7	9	182	37	0	7.8	13.0	0.2
12/07/2021 14:25	61.1	287	9.31	251.8	0.7	11	188	40	0	7.2	13.1	0.2
12/07/2021 14:26	61.0	287	9.39	253.9	0.7	10	187	46	0	7.1	12.7	0.2
12/07/2021 14:27	61.0	287	9.60	252.5	0.6	9	185	44	0	7.7	12.9	0.2
12/07/2021 14:28	61.9	287	9.31	252.0	0.4	9	175	45	0	6.8	12.9	0.2
12/07/2021 14:29	61.5	287	9.33	252.6	0.4	10	177	46	0	7.2	12.7	0.2
12/07/2021 14:30	60.6	286	9.58	255.9	0.7	10	183	58	0	7.6	12.6	0.2
12/07/2021 14:31	59.9	285	9.15	256.9	0.7	9	180	54	0	7.3	12.9	0.2
12/07/2021 14:32	59.7	287	9.45	255.9	0.8	9	176	50	0	8.6	13.1	0.2
12/07/2021 14:33	59.6	288	9.13	258.3	0.9	11	170	48	0	8.1	13.1	0.2
12/07/2021 14:34	59.9	289	9.75	258.8	0.0	13	171	43	0	8.5	13.2	0.2
12/07/2021 14:35	60.2	291	9.36	252.8	0.2	11	173	43	0	8.2	13.2	0.2
12/07/2021 14:36	60.6	292	9.31	252.8	0.1	11	179	42	0	8.0	13.1	0.2
12/07/2021 14:37	60.5	292	9.66	252.3	0.0	11	171	40	0	8.0	13.0	0.2
Period Average =	61.0	288	9.46	254.5	0.7	10	178	41	0	7.5	12.9	0.2
Period Max Value =	63.8	293	13.59	264.8	3.8	14	198	58	0	8.6	13.3	0.2
Period Min Value =	59.1	285	8.48	249.5	0.0	7	148	32	0	6.8	12.6	0.2
Period Totals =	3.7220E+3	1.7589E+4	5.7685E+2	1.5524E+4	4.1700E+1	6.1200E+2	1.0881E+4	2.4200E+3	0.0000E+0	4.4190E+2	7.8870E+2	1.2200E+1
Period % Recovery =	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.3	100.0	98.3	100.0	100.0

Data Summary Report

HCl Run 2

Company:	Covanta Marion, Inc. P.O. Box 9126 Salem, OR 97305
Source:	Unit #1
Data Group:	All Data Groups
Report Name:	! Stack Test - Op & CEM Data - U1-pk
Start of Report:	12/07/2021 16:05

End of Report: 12/07/2021 17:05

Validation: Valid Data Only

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 16:05	57.9	314	9.45	257.5	0.5	8	191	40	0	8.3	13.6	0.2
12/07/2021 16:06	57.6	313	9.75	254.9	0.5	8	180	43	0	8.7	13.6	0.2
12/07/2021 16:07	57.4	313	9.29	256.2	0.7	8	177	46	0	9.0	13.6	0.2
12/07/2021 16:08	56.7	314	9.29	254.9	0.4	8	181	42	0	9.7	13.9	0.2
12/07/2021 16:09	56.9	314	9.57	251.9	0.5	10	184	40	0	9.7	14.3	0.2
12/07/2021 16:10	56.8	314	9.33	254.4	1.0	10	183	43	0	9.3	13.9	0.2
12/07/2021 16:11	56.0	314	9.17	251.2	0.6	8	186	44	0	9.8	14.0	0.2
12/07/2021 16:12	56.6	314	13.04	256.5	1.0	8	184	42	0	9.3	14.1	0.2
12/07/2021 16:13	57.7	314	9.23	256.3	1.2	10	178	44	0	8.7	13.6	0.2
12/07/2021 16:14	58.0	314	9.44	253.1	1.2	8	173	42	0	9.2	13.6	0.2
12/07/2021 16:15	58.4	314	9.31	251.0	0.8							0.2
12/07/2021 16:16	56.9	314	9.34	254.1	0.6							0.2
12/07/2021 16:17	56.9	314	9.58	257.4	0.1		174	42	0	8.9<	13.9<	0.2
12/07/2021 16:18	56.5	314	9.27	256.3	0.2	6	189	40	0	9.5	13.8	0.2
12/07/2021 16:19	57.2	314	9.59	256.2	0.2	8	188	39	0	9.2	13.9	0.2
12/07/2021 16:20	57.6	314	9.33	255.5	0.5	8	188	38	0	9.8	13.9	0.2
12/07/2021 16:21	56.3	314	9.34	250.3	0.4	6	181	32	0	10.3	14.3	0.2
12/07/2021 16:22	55.7	314	9.52	254.0	0.6	9	171	29	0	10.5	14.6	0.2
12/07/2021 16:23	56.5	314	9.53	251.7	0.4	8	168	35	0	9.0	13.9	0.2
12/07/2021 16:24	56.1	314	9.44	256.8	0.1	10	173	37	0	9.6	13.8	0.2
12/07/2021 16:25	55.7	314	9.35	252.4	0.1	8	175	31	0	10.1	14.2	0.2
12/07/2021 16:26	55.9	313	9.28	251.3	0.4	8	180	31	0	9.1	14.0	0.2
12/07/2021 16:27	55.8	313	9.39	257.3	0.5	8	192	32	0	9.3	13.7	0.2
12/07/2021 16:28	55.8	313	9.35	252.5	0.9	8	192	31	0	9.9	14.0	0.2
12/07/2021 16:29	54.9	313	9.61	254.1	0.8	6	191	29	0	10.7	14.4	0.2
12/07/2021 16:30	53.4	313	9.25	252.1	1.2	7	182	27	0	10.7	14.8	0.2
12/07/2021 16:31	54.2	312	9.40	254.2	0.6	8	171	33	0	9.2	14.2	0.2
12/07/2021 16:32	56.2	312	9.40	258.2	0.4	8	187	36	0	8.8	13.7	0.2
12/07/2021 16:33	56.3	312	9.56	256.7	0.8	8	193	34	0	9.6	13.8	0.2
12/07/2021 16:34	55.8	312	9.39	254.2	1.0	6	182	32	0	10.3	14.3	0.2
12/07/2021 16:35	55.2	312	9.26	253.3	1.0	6	177	30	0	10.1	14.4	0.2
12/07/2021 16:36	54.2	312	9.49	255.7	0.8	9	177	27	0	10.2	14.4	0.2

Date/Time Printed: 12/07/2021 17:24

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 16:37	55.1	312	9.40	252.8	1.1	8	181	28	0	9.3	14.2	0.2
12/07/2021 16:38	56.0	312	9.39	253.0	1.1	8	185	34	0	9.3	13.8	0.2
12/07/2021 16:39	55.5	312	9.47	256.3	1.2	6	184	31	0	10.1	14.2	0.2
12/07/2021 16:40	54.9	311	9.45	254.8	1.0	8	173	29	0	9.9	14.3	0.2
12/07/2021 16:41	54.6	311	9.40	254.4	1.0	8	176	28	0	10.1	14.4	0.2
12/07/2021 16:42	55.1	311	9.42	254.7	1.0	8	178	31	0	8.8	14.0	0.2
12/07/2021 16:43	55.9	311	9.29	254.8	1.0	8	183	35	0	9.1	13.6	0.2
12/07/2021 16:44	54.8	311	9.54	249.3	1.0	8	177	29	0	9.8	14.1	0.2
12/07/2021 16:45	54.7	311	9.36	253.6	0.5	8	168	28	0	9.5	14.2	0.2
12/07/2021 16:46	54.6	311	9.31	253.2	0.3	8	176	27	0	9.7	14.0	0.2
12/07/2021 16:47	53.7	311	9.57	252.8	0.4	6	171	23	0	10.0	14.2	0.2
12/07/2021 16:48	54.6	311	9.32	255.9	0.3	9	167	21	0	9.9	14.4	0.2
12/07/2021 16:49	54.9	311	9.60	255.7	0.2	8	171	19	0	9.2	13.9	0.2
12/07/2021 16:50	54.8	310	9.26	257.1	0.2	6	182	14	0	10.1	14.2	0.2
12/07/2021 16:51	52.9	310	9.04	251.7	0.4	6	185	15	0	10.4	14.5	0.2
12/07/2021 16:52	52.2	310	9.71	251.7	0.8	9	182	17	0	10.2	14.6	0.2
12/07/2021 16:53	52.1	310	9.30	253.5	0.3	6	175	20	0	9.6	14.2	0.2
12/07/2021 16:54	52.3	310	14.57	252.7	0.1	6	172	22	0	10.0	14.1	0.2
12/07/2021 16:55	52.9	310	10.52	252.9	0.0	6	181	17	0	9.7	14.4	0.2
12/07/2021 16:56	53.0	310	9.62	256.9	0.1	8	178	21	0	9.5	14.0	0.2
12/07/2021 16:57	53.0	309	9.23	255.3	0.3	6	183	21	0	9.5	14.1	0.2
12/07/2021 16:58	52.9	309	9.39	255.8	0.2	8	181	22	0	9.1	13.9	0.2
12/07/2021 16:59	53.6	309	9.42	251.9	0.4	6	184	21	0	9.1	14.0	0.2
12/07/2021 17:00	54.9	309	9.50	253.6	0.0	6	185	24	0	8.8	13.8	0.2
12/07/2021 17:01	55.5	309	9.54	252.2	0.6	8	177	25	0	8.8	13.7	0.2
12/07/2021 17:02	54.3	309	9.16	256.4	0.3	8	175	27	0	9.6	13.8	0.2
12/07/2021 17:03	52.9	309	9.34	254.2	0.4	9	174	26	0	10.1	14.4	0.2
12/07/2021 17:04	52.9	309	9.63	254.1	0.0	6	168	28	0	9.1	14.1	0.2
12/07/2021 17:05	52.7	309	9.22	257.0	0.0	8	178	27	0	9.6	14.0	0.2
Period Average =	55.3	312	9.57	254.3	0.6	8	180	31	0	9.6	14.1	0.2
Period Max Value =	58.4	314	14.57	258.2	1.2	10	193	46	0	10.7	14.8	0.2
Period Min Value =	52.1	309	9.04	249.3	0.0	6	167	14	0	8.3	13.6	0.2
Period Totals =	3.3704E+3	1.9026E+4	5.8351E+2	1.5510E+4	3.4200E+1	4.4400E+2	1.0598E+4	1.8010E+3	0.0000E+0	5.6440E+2	8.2930E+2	1.2200E+1
Period % Recovery =	100.0	100.0	100.0	100.0	100.0	96.7	98.3	98.3	98.3	98.3	98.3	100.0

Data Summary Report

Metals Run 1

Company: Covanta Marion, Inc.
P.O. Box 9126
Salem, OR 97305
Source: Unit #1
Data Group: All Data Groups
Report Name: ! Stack Test - Op & CEM Data - U1-pk
Start of Report: 12/07/2021 13:37 End of Report: 12/07/2021 15:45 Validation: Valid Data Only

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 13:37	61.5	293	9.40	255.7	1.0	11	175	47	0	7.7	13.2	0.2
12/07/2021 13:38	60.2	292	9.05	253.3	0.9	10	180	52	0	7.5	12.9	0.2
12/07/2021 13:39	59.9	292	9.39	251.1	0.8	10	176	47	0	7.5	12.9	0.2
12/07/2021 13:40	60.4	292	9.62	251.8	0.8	11	179	44	0	7.8	13.0	0.2
12/07/2021 13:41	59.2	292	9.29	251.6	0.9	11	178	40	0	8.2	13.2	0.2
12/07/2021 13:42	59.4	292	9.17	250.2	0.8	9	179	37	0	7.9	13.3	0.2
12/07/2021 13:43	59.8	292	9.66	250.4	0.8	11	178	39	0	7.3	13.1	0.2
12/07/2021 13:44	59.9	292	9.72	250.6	0.9	9	168	41	0	7.1	12.8	0.2
12/07/2021 13:45	60.4	291	8.93	250.6	0.1	10	157	41	0	7.2	12.8	0.2
12/07/2021 13:46	61.0	291	9.49	249.5	0.0	10	165	45	0	7.0	12.7	0.2
12/07/2021 13:47	61.3	291	9.60	251.7	0.0	10	178	44	0	7.4	12.7	0.2
12/07/2021 13:48	61.9	291	9.33	252.8	0.0	9	183	43	0	7.3	13.0	0.2
12/07/2021 13:49	62.3	290	9.50	251.1	0.0	10	169	49	0	7.2	12.7	0.2
12/07/2021 13:50	61.8	290	9.05	252.3	0.0	9	180	45	0	7.5	12.9	0.2
12/07/2021 13:51	61.3	290	9.72	252.7	0.0	11	183	45	0	7.8	13.0	0.2
12/07/2021 13:52	60.6	289	9.58	255.5	0.0	10	175	43	0	7.2	13.0	0.2
12/07/2021 13:53	59.1	289	9.36	254.9	0.0	12	173	42	0	7.9	12.9	0.2
12/07/2021 13:54	59.6	289	9.43	255.2	0.0	11	181	37	0	7.6	13.2	0.2
12/07/2021 13:55	60.8	289	9.28	257.4	0.0	10	177	43	0	7.2	12.9	0.2
12/07/2021 13:56	61.6	288	9.47	256.2	0.0	12	186	41	0	7.6	12.8	0.2
12/07/2021 13:57	61.8	288	9.28	255.6	0.1	11	187	37	0	7.4	13.0	0.2
12/07/2021 13:58	62.0	288	9.47	256.9	0.2	10	180	38	0	7.0	12.8	0.2
12/07/2021 13:59	61.8	288	9.26	260.1	0.1	10	181	40	0	7.2	12.7	0.2
12/07/2021 14:00	61.6	288	9.66	259.4	0.0	9	189	39	0	7.5	12.8	0.2
12/07/2021 14:01	61.8	287	9.28	258.3	0.5	9	190	38	0	7.3	12.9	0.2
12/07/2021 14:02	61.8	287	9.32	258.3	0.5	10	177	41	0	7.0	12.7	0.2
12/07/2021 14:03	61.3	287	9.48	252.7	0.7	14	173	39	0	7.5	12.8	0.2
12/07/2021 14:04	61.2	287	9.43	255.5	0.4	11	183	34	0	8.0	13.1	0.2
12/07/2021 14:05	61.7	287	9.39	257.2	1.0	11	176	36	0	6.9	13.0	0.2
12/07/2021 14:06	62.4	287	9.42	260.3	0.0	10	191	36	0	7.0	12.6	0.2
12/07/2021 14:07	63.7	287	9.21	264.8	0.3	8	197	36	0	6.8	12.6	0.2
12/07/2021 14:08	63.8	287	9.40	256.8	3.8	8	190	38	0	7.6	12.7	0.2

Date/Time Printed: 12/07/2021 17:19

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 14:09	63.6	287	8.48	255.7	3.0	7	198	35	0	7.7	13.1	0.2
12/07/2021 14:10	63.4	287	13.59	254.4	0.0	10	190	36	0	7.4	12.9	0.2
12/07/2021 14:11	62.7	286	9.20	255.5	3.1	9	195	35	0	7.4	12.9	0.2
12/07/2021 14:12	61.9	286	9.72	254.8	0.7	9	188	36	0	7.4	12.9	0.2
12/07/2021 14:13	61.3	286	9.21	252.8	1.0	9	192	33	0	7.9	13.0	0.2
12/07/2021 14:14	61.3	286	9.45	255.0	0.4	11	189	32	0	7.3	13.1	0.2
12/07/2021 14:15	60.4	286	9.38	254.5	0.9	10	183		0		12.8	0.2
12/07/2021 14:16	60.1	286	9.45	254.4	2.2	9	189		0		13.3	0.2
12/07/2021 14:17	59.7	286	9.48	253.1	2.4	11	174	37	0	7.1 <	13.0	0.2
12/07/2021 14:18	59.9	286	9.25	256.7	2.1	9	154	36	0	7.6	12.9	0.2
12/07/2021 14:19	60.3	286	9.77	252.8	1.7	9	148	36	0	7.3	13.0	0.2
12/07/2021 14:20	59.8	286	9.03	250.6	1.1	10	149	39	0	7.4	12.9	0.2
12/07/2021 14:21	60.0	286	9.48	251.7	0.7	10	158	37	0	7.4	12.9	0.2
12/07/2021 14:22	60.7	287	9.68	256.4	0.5	10	164	37	0	7.3	12.9	0.2
12/07/2021 14:23	61.6	287	9.20	255.2	0.4	9	179	38	0	7.5	12.9	0.2
12/07/2021 14:24	60.9	287	9.51	254.2	0.7	9	182	37	0	7.8	13.0	0.2
12/07/2021 14:25	61.1	287	9.31	251.8	0.7	11	188	40	0	7.2	13.1	0.2
12/07/2021 14:26	61.0	287	9.39	253.9	0.7	10	187	46	0	7.1	12.7	0.2
12/07/2021 14:27	61.0	287	9.60	252.5	0.6	9	185	44	0	7.7	12.9	0.2
12/07/2021 14:28	61.9	287	9.31	252.0	0.4	9	175	45	0	6.8	12.9	0.2
12/07/2021 14:29	61.5	287	9.33	252.6	0.4	10	177	46	0	7.2	12.7	0.2
12/07/2021 14:30	60.6	286	9.58	255.9	0.7	10	183	58	0	7.6	12.6	0.2
12/07/2021 14:31	59.9	285	9.15	256.9	0.7	9	180	54	0	7.3	12.9	0.2
12/07/2021 14:32	59.7	287	9.45	255.9	0.8	9	176	50	0	8.6	13.1	0.2
12/07/2021 14:33	59.6	288	9.13	258.3	0.9	11	170	48	0	8.1	13.1	0.2
12/07/2021 14:34	59.9	289	9.75	258.8	0.0	13	171	43	0	8.5	13.2	0.2
12/07/2021 14:35	60.2	291	9.36	252.8	0.2	11	173	43	0	8.2	13.2	0.2
12/07/2021 14:36	60.6	292	9.31	252.8	0.1	11	179	42	0	8.0	13.1	0.2
12/07/2021 14:37	60.5	292	9.66	252.3	0.0	11	171	40	0	8.0	13.0	0.2
12/07/2021 14:38	60.4	293	9.41	248.2	0.1	11	188	37	0	8.5	13.2	0.2
12/07/2021 14:39	60.6	294	9.35	249.1	0.2	13	183	39	0	8.1	13.2	0.2
12/07/2021 14:40	61.0	294	9.71	253.8	0.3	13	180	40	0	8.3	13.3	0.2
12/07/2021 14:41	60.6	295	9.16	253.3	0.2	12	201	37	0	7.8	13.1	0.2
12/07/2021 14:42	59.1	295	9.41	255.2	0.5	14	190	39	0	8.3	13.1	0.2
12/07/2021 14:43	58.8	295	9.33	256.2	0.3	14	175	42	0	7.9	13.2	0.2
12/07/2021 14:44	58.4	295	9.45	255.0	0.1	14	159	42	0	8.3	13.1	0.2
12/07/2021 14:45	57.4	295	9.48	254.2	0.2	15	164	35	0	8.3	13.3	0.2
12/07/2021 14:46	56.7	295	9.27	252.7	0.0	13	187	30	0	8.8	13.5	0.2
12/07/2021 14:47	56.3	294	9.38	255.7	0.3	13	184	32	0	8.7	13.5	0.2
12/07/2021 14:48	55.5	294	9.48	255.5	0.4	13	189	28	0	9.1	13.7	0.2
12/07/2021 14:49	53.0	294	9.40	256.9	0.4	12	185	25	0	9.8	13.9	0.2
12/07/2021 14:50	51.6	294	16.30	254.3	0.6	13	187	20	0	9.9	14.3	0.2

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 14:51	51.0	293	10.17	256.1	0.4	12	182	22	0	9.4	14.0	0.2
12/07/2021 14:52	50.8	293	9.45	255.0	0.8	12	178	25	0	9.3	14.0	0.2
12/07/2021 14:53	50.3	293	9.39	257.3	0.4	12	165	28	0	9.1	13.8	0.2
12/07/2021 14:54	50.4	293	9.33	261.3	0.0	12	168	25	0	8.7	13.7	0.2
12/07/2021 14:55	50.5	293	9.50	255.6	0.0	11	162	33	0	9.0	13.4	0.2
12/07/2021 14:56	50.7	294	9.54	250.4	0.1	14	187	27	0	10.1	14.1	0.2
12/07/2021 14:57	51.3	296	9.31	251.8	0.0	14	186	26	0	9.6	14.0	0.2
12/07/2021 14:58	53.2	298	9.35	250.1	0.1	16	189	25	0	9.2	13.9	0.2
12/07/2021 14:59	55.4	299	9.49	251.2	0.6	15	180	32	0	8.4	13.4	0.2
12/07/2021 15:00	57.3	301	9.31	253.3	0.1	15	171	33	0	8.1	13.3	0.2
12/07/2021 15:01	58.7	302	9.57	253.9	0.1	18	173	31	0	8.2	13.2	0.2
12/07/2021 15:02	60.9	303	9.14	254.1	0.0	17	177	33	0	7.2	12.9	0.2
12/07/2021 15:03	62.7	304	9.68	254.1	0.0	16	164	39	0	6.7	12.4	0.2
12/07/2021 15:04	64.6	305	9.35	253.6	0.0	15	158	35	0	6.7	12.4	0.2
12/07/2021 15:05	65.9	306	9.47	253.5	0.0	15	157	36	0	6.8	12.3	0.2
12/07/2021 15:06	66.8	306	9.31	255.2	0.0	13	161	35	0	7.1	12.4	0.2
12/07/2021 15:07	68.3	306	9.49	256.2	0.0	12	168	37	0	7.1	12.6	0.2
12/07/2021 15:08	68.0	307	9.04	253.3	0.0	12	172	40	0	7.2	12.5	0.2
12/07/2021 15:09	67.7	307	9.67	255.0	0.0	15	180	35	0	7.3	12.7	0.2
12/07/2021 15:10	65.8	307	9.75	259.3	0.0	17	185	42	0	7.7	12.7	0.2
12/07/2021 15:11	61.8	307	9.27	259.4	0.5	15	206	31	0	9.3	13.4	0.2
12/07/2021 15:12	57.5	306	9.36	257.1	1.1	14	223	23	0	10.4	14.2	0.2
12/07/2021 15:13	53.8	305	9.25	255.2	1.5	13	217	15	0	10.9	14.6	0.2
12/07/2021 15:14	51.5	304	9.55	255.2	2.1	14	206	14	0	11.0	14.8	0.2
12/07/2021 15:15	51.1	304	9.75	253.6	2.4	13	192		0		14.7	0.2
12/07/2021 15:16	51.9	303	9.11	253.5	2.4	13	170		0		14.3	0.2
12/07/2021 15:17	53.6	303	9.41	255.4	2.1	12	152	25	0	8.3<	13.8	0.2
12/07/2021 15:18	57.2	303	9.38	252.8	1.7	11	158	26	0	7.8	13.3	0.2
12/07/2021 15:19	60.2	304	9.47	250.5	1.2	14	159	36	0	7.0	12.7	0.2
12/07/2021 15:20	60.9	304	9.30	251.2	0.9	14	169	36	0	8.0	12.9	0.2
12/07/2021 15:21	60.5	303	9.58	254.2	0.8	11	174	30	0	8.0	13.1	0.2
12/07/2021 15:22	58.3	302	9.31	253.6	0.6	11	180	31	0	8.8	13.2	0.2
12/07/2021 15:23	54.1	302	9.58	251.2	1.1	13	207	23	0	10.8	14.3	0.2
12/07/2021 15:24	51.3	301	9.49	253.3	1.6	14	207	18	0	11.0	14.8	0.2
12/07/2021 15:25	51.2	301	9.10	254.5	2.0	11	194	19	0	10.2	14.7	0.2
12/07/2021 15:26	52.8	301	9.55	254.5	2.1	12	183	28	0	9.3	14.1	0.2
12/07/2021 15:27	55.1	301	9.49	253.4	2.1	10	173	32	0	8.2	13.7	0.2
12/07/2021 15:28	58.0	301	9.21	252.8	1.9	11	167	39	0	7.5	13.0	0.2
12/07/2021 15:29	59.5	301	9.56	255.6	1.7	10	176	35	0	7.8	12.9	0.2
12/07/2021 15:30	59.2	302	10.53	257.8	1.7	12	170	36	0	8.2	13.1	0.2
12/07/2021 15:31	57.9	302	15.37	257.2	1.6	11	180	28	0	9.0	13.6	0.2
12/07/2021 15:32	56.4	302	9.64	257.9	1.7	12	192	30	0	9.4	13.7	0.2

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 15:33	55.5	302	9.33	255.5	2.0	10	204	25	0	9.8	14.1	0.2
12/07/2021 15:34	53.9	301	9.55	255.6	2.4	8	192	28	0	9.7	14.0	0.2
12/07/2021 15:35	52.8	301	9.51	253.8	2.6	8	189	25	0	9.9	14.2	0.2
12/07/2021 15:36	53.2	301	9.40	286.1	2.6	10	178	27	0	9.0	14.0	0.2
12/07/2021 15:37	54.9	302	9.09	302.2	2.6	9	171	31	0	8.3	13.6	0.2
12/07/2021 15:38	56.8	304	9.66	281.7	2.4	9	168	35	0	7.9	13.2	0.2
12/07/2021 15:39	58.5	306	9.46	270.1	2.2	11	167	36	0	7.7	13.0	0.2
12/07/2021 15:40	59.0	308	9.35	263.1	2.0	10	163	42	0	7.0	12.9	0.2
12/07/2021 15:41	58.8	309	9.40	260.5	1.6	11	164	39	0	8.3	13.1	0.2
12/07/2021 15:42	57.9	311	9.41	254.2	1.5	9	175	39	0	8.5	13.4	0.2
12/07/2021 15:43	56.8	312	9.40	255.3	1.4	10	183	39	0	9.5	13.7	0.2
12/07/2021 15:44	54.9	312	9.40	252.8	1.5	10	188	38	0	9.6	14.1	0.2
12/07/2021 15:45	55.2	313	9.40	251.9	1.7	10	193	47	0	8.6	13.8	0.2
Period Average =	58.9	295	9.55	255.5	0.8	11	179	36	0	8.1	13.2	0.2
Period Max Value =	68.3	313	16.30	302.2	3.8	18	223	58	0	11.0	14.8	0.2
Period Min Value =	50.3	285	8.48	248.2	0.0	7	148	14	0	6.7	12.3	0.2
Period Totals =	7.6037E+3	3.8066E+4	1.2319E+3	3.2957E+4	1.0920E+2	1.4610E+3	2.3106E+4	4.5110E+3	0.0000E+0	1.0113E+3	1.7068E+3	2.5800E+1
Period % Recovery =	100.0	100.0	100.0	100.0	100.0	100.0	100.0	97.6	100.0	97.7	100.0	100.0

Data Summary Report

Metals Run 2

Company: Covanta Marion, Inc.
P.O. Box 9126
Salem, OR 97305
Source: Unit #1
Data Group: All Data Groups
Report Name: ! Stack Test - Op & CEM Data - U1-pk
Start of Report: 12/07/2021 16:05 End of Report: 12/07/2021 18:12 Validation: Valid Data Only

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 16:05	57.9	314	9.45	257.5	0.5	8	191	40	0	8.3	13.6	0.2
12/07/2021 16:06	57.6	313	9.75	254.9	0.5	8	180	43	0	8.7	13.6	0.2
12/07/2021 16:07	57.4	313	9.29	256.2	0.7	8	177	46	0	9.0	13.6	0.2
12/07/2021 16:08	56.7	314	9.29	254.9	0.4	8	181	42	0	9.7	13.9	0.2
12/07/2021 16:09	56.9	314	9.57	251.9	0.5	10	184	40	0	9.7	14.3	0.2
12/07/2021 16:10	56.8	314	9.33	254.4	1.0	10	183	43	0	9.3	13.9	0.2
12/07/2021 16:11	56.0	314	9.17	251.2	0.6	8	186	44	0	9.8	14.0	0.2
12/07/2021 16:12	56.6	314	13.04	256.5	1.0	8	184	42	0	9.3	14.1	0.2
12/07/2021 16:13	57.7	314	9.23	256.3	1.2	10	178	44	0	8.7	13.6	0.2
12/07/2021 16:14	58.0	314	9.44	253.1	1.2	8	173	42	0	9.2	13.6	0.2
12/07/2021 16:15	58.4	314	9.31	251.0	0.8							0.2
12/07/2021 16:16	56.9	314	9.34	254.1	0.6							0.2
12/07/2021 16:17	56.9	314	9.58	257.4	0.1		174	42	0	8.9 <	13.9 <	0.2
12/07/2021 16:18	56.5	314	9.27	256.3	0.2	6	189	40	0	9.5	13.8	0.2
12/07/2021 16:19	57.2	314	9.59	256.2	0.2	8	188	39	0	9.2	13.9	0.2
12/07/2021 16:20	57.6	314	9.33	255.5	0.5	8	188	38	0	9.8	13.9	0.2
12/07/2021 16:21	56.3	314	9.34	250.3	0.4	6	181	32	0	10.3	14.3	0.2
12/07/2021 16:22	55.7	314	9.52	254.0	0.6	9	171	29	0	10.5	14.6	0.2
12/07/2021 16:23	56.5	314	9.53	251.7	0.4	8	168	35	0	9.0	13.9	0.2
12/07/2021 16:24	56.1	314	9.44	256.8	0.1	10	173	37	0	9.6	13.8	0.2
12/07/2021 16:25	55.7	314	9.35	252.4	0.1	8	175	31	0	10.1	14.2	0.2
12/07/2021 16:26	55.9	313	9.28	251.3	0.4	8	180	31	0	9.1	14.0	0.2
12/07/2021 16:27	55.8	313	9.39	257.3	0.5	8	192	32	0	9.3	13.7	0.2
12/07/2021 16:28	55.8	313	9.35	252.5	0.9	8	192	31	0	9.9	14.0	0.2
12/07/2021 16:29	54.9	313	9.61	254.1	0.8	6	191	29	0	10.7	14.4	0.2
12/07/2021 16:30	53.4	313	9.25	252.1	1.2	7	182	27	0	10.7	14.8	0.2
12/07/2021 16:31	54.2	312	9.40	254.2	0.6	8	171	33	0	9.2	14.2	0.2
12/07/2021 16:32	56.2	312	9.40	258.2	0.4	8	187	36	0	8.8	13.7	0.2
12/07/2021 16:33	56.3	312	9.56	256.7	0.8	8	193	34	0	9.6	13.8	0.2
12/07/2021 16:34	55.8	312	9.39	254.2	1.0	6	182	32	0	10.3	14.3	0.2
12/07/2021 16:35	55.2	312	9.26	253.3	1.0	6	177	30	0	10.1	14.4	0.2
12/07/2021 16:36	54.2	312	9.49	255.7	0.8	9	177	27	0	10.2	14.4	0.2

Date/Time Printed: 12/07/2021 18:13

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 16:37	55.1	312	9.40	252.8	1.1	8	181	28	0	9.3	14.2	0.2
12/07/2021 16:38	56.0	312	9.39	253.0	1.1	8	185	34	0	9.3	13.8	0.2
12/07/2021 16:39	55.5	312	9.47	256.3	1.2	6	184	31	0	10.1	14.2	0.2
12/07/2021 16:40	54.9	311	9.45	254.8	1.0	8	173	29	0	9.9	14.3	0.2
12/07/2021 16:41	54.6	311	9.40	254.4	1.0	8	176	28	0	10.1	14.4	0.2
12/07/2021 16:42	55.1	311	9.42	254.7	1.0	8	178	31	0	8.8	14.0	0.2
12/07/2021 16:43	55.9	311	9.29	254.8	1.0	8	183	35	0	9.1	13.6	0.2
12/07/2021 16:44	54.8	311	9.54	249.3	1.0	8	177	29	0	9.8	14.1	0.2
12/07/2021 16:45	54.7	311	9.36	253.6	0.5	8	168	28	0	9.5	14.2	0.2
12/07/2021 16:46	54.6	311	9.31	253.2	0.3	8	176	27	0	9.7	14.0	0.2
12/07/2021 16:47	53.7	311	9.57	252.8	0.4	6	171	23	0	10.0	14.2	0.2
12/07/2021 16:48	54.6	311	9.32	255.9	0.3	9	167	21	0	9.9	14.4	0.2
12/07/2021 16:49	54.9	311	9.60	255.7	0.2	8	171	19	0	9.2	13.9	0.2
12/07/2021 16:50	54.8	310	9.26	257.1	0.2	6	182	14	0	10.1	14.2	0.2
12/07/2021 16:51	52.9	310	9.04	251.7	0.4	6	185	15	0	10.4	14.5	0.2
12/07/2021 16:52	52.2	310	9.71	251.7	0.8	9	182	17	0	10.2	14.6	0.2
12/07/2021 16:53	52.1	310	9.30	253.5	0.3	6	175	20	0	9.6	14.2	0.2
12/07/2021 16:54	52.3	310	14.57	252.7	0.1	6	172	22	0	10.0	14.1	0.2
12/07/2021 16:55	52.9	310	10.52	252.9	0.0	6	181	17	0	9.7	14.4	0.2
12/07/2021 16:56	53.0	310	9.62	256.9	0.1	8	178	21	0	9.5	14.0	0.2
12/07/2021 16:57	53.0	309	9.23	255.3	0.3	6	183	21	0	9.5	14.1	0.2
12/07/2021 16:58	52.9	309	9.39	255.8	0.2	8	181	22	0	9.1	13.9	0.2
12/07/2021 16:59	53.6	309	9.42	251.9	0.4	6	184	21	0	9.1	14.0	0.2
12/07/2021 17:00	54.9	309	9.50	253.6	0.0	6	185	24	0	8.8	13.8	0.2
12/07/2021 17:01	55.5	309	9.54	252.2	0.6	8	177	25	0	8.8	13.7	0.2
12/07/2021 17:02	54.3	309	9.16	256.4	0.3	8	175	27	0	9.6	13.8	0.2
12/07/2021 17:03	52.9	309	9.34	254.2	0.4	9	174	26	0	10.1	14.4	0.2
12/07/2021 17:04	52.9	309	9.63	254.1	0.0	6	168	28	0	9.1	14.1	0.2
12/07/2021 17:05	52.7	309	9.22	257.0	0.0	8	178	27	0	9.6	14.0	0.2
12/07/2021 17:06	52.0	308	9.37	255.2	0.2	6	194	26	0	9.7	14.2	0.2
12/07/2021 17:07	51.6	307	9.33	254.1	0.0	6	197	23	0	8.7	13.9	0.2
12/07/2021 17:08	53.1	307	9.69	253.8	0.3	6	173	27	0	8.9	13.4	0.2
12/07/2021 17:09	54.7	308	9.28	253.2	1.1	8	186	24	0	9.1	13.7	0.2
12/07/2021 17:10	55.3	309	9.53	251.0	0.4	8	187	21	0	9.8	13.9	0.2
12/07/2021 17:11	54.4	310	9.34	255.1	1.2	6	190	21	0	10.5	14.3	0.2
12/07/2021 17:12	54.2	311	9.51	254.8	0.8	9	186	23	0	9.9	14.4	0.2
12/07/2021 17:13	54.4	312	9.31	253.1	0.8	6	177	22	0	9.7	14.1	0.2
12/07/2021 17:14	54.2	312	9.24	252.2	1.2	6	171	18	0	10.0	14.2	0.2
12/07/2021 17:15	54.1	312	9.41	253.6	0.7	8	174		0		14.2	0.2
12/07/2021 17:16	53.8	313	9.47	253.3	1.0	8	179		0		14.1	0.2
12/07/2021 17:17	53.5	313	9.46	257.0	0.4	8	183	17	0	10.0<	13.9	0.2
12/07/2021 17:18	53.4	313	9.44	257.6	1.0	8	186	13	0	9.9	14.3	0.2

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 17:19	53.3	312	9.30	253.1	0.7	6	186	14	0	9.1	14.1	0.2
12/07/2021 17:20	54.0	313	9.60	252.4	1.2	6	187	15	0	10.1	13.8	0.2
12/07/2021 17:21	54.7	314	8.99	254.2	1.5	8	211	15	0	10.1	14.2	0.2
12/07/2021 17:22	54.9	315	9.78	253.1	1.9	6	204	15	0	10.1	14.1	0.2
12/07/2021 17:23	55.1	316	9.26	258.3	2.2	6	190	17	0	10.5	14.2	0.2
12/07/2021 17:24	54.2	317	9.48	257.4	2.4	9	190	15	0	10.8	14.5	0.2
12/07/2021 17:25	53.0	318	9.41	252.8	2.4	7	182	15	0	10.8	14.6	0.2
12/07/2021 17:26	53.0	319	9.37	251.8	2.5	9	181	16	0	10.3	14.4	0.2
12/07/2021 17:27	53.0	320	9.50	250.5	2.5	6	176	15	0	10.6	14.4	0.2
12/07/2021 17:28	54.2	320	9.42	255.7	2.4	8	169	16	0	9.9	14.2	0.2
12/07/2021 17:29	55.9	319	9.41	254.0	2.3	6	180	16	0	9.9	14.0	0.2
12/07/2021 17:30	56.2	319	9.43	251.3	2.3	8	181	17	0	10.2	14.1	0.2
12/07/2021 17:31	55.0	319	9.52	252.5	2.3	6	171	17	0	10.8	14.4	0.2
12/07/2021 17:32	54.0	319	9.23	253.8	2.1	7	163	15	0	10.9	14.7	0.2
12/07/2021 17:33	53.7	318	9.32	232.8	1.8	9	165	15	0	10.4	14.5	0.2
12/07/2021 17:34	53.9	317	9.58	226.7	1.6	6	181	14	0	10.1	14.2	0.2
12/07/2021 17:35	54.1	314	9.00	237.1	1.8	8	190	14	0	10.1	14.3	0.2
12/07/2021 17:36	55.0	311	17.34	236.0	1.9	6	194	14	0	9.7	14.0	0.2
12/07/2021 17:37	55.8	308	9.74	246.8	2.2	6	190	15	0	9.9	14.0	0.2
12/07/2021 17:38	55.3	306	9.27	262.2	2.3	6	181	14	0	10.3	14.2	0.2
12/07/2021 17:39	54.8	305	9.30	264.2	2.2	6	173	15	0	10.6	14.4	0.2
12/07/2021 17:40	54.2	304	9.60	260.8	2.0	9	160	14	0	10.3	14.4	0.2
12/07/2021 17:41	55.0	303	9.13	260.1	1.6	8	159	14	0	9.7	14.2	0.2
12/07/2021 17:42	56.2	302	9.59	259.1	1.4	6	175	16	0	9.9	13.9	0.2
12/07/2021 17:43	54.7	301	9.49	256.2	1.4	9	177	15	0	10.8	14.4	0.2
12/07/2021 17:44	53.5	301	9.54	256.5	1.2	9	166	13	0	11.2	14.8	0.2
12/07/2021 17:45	52.8	300	9.30	258.4	0.9	7	168	12	0	10.7	14.7	0.2
12/07/2021 17:46	51.5	300	9.42	256.3	0.7	9	181	13	0	10.9	14.6	0.2
12/07/2021 17:47	51.1	299	9.39	256.2	1.2	9	190	9	0	10.2	14.5	0.2
12/07/2021 17:48	50.1	299	9.41	253.6	1.2	6	185	10	0	10.0	14.1	0.2
12/07/2021 17:49	50.6	300	9.40	256.5	1.4	7	199	9	0	11.1	14.7	0.2
12/07/2021 17:50	52.9	301	9.41	254.8	1.6	7	185	7	0	10.5	14.5	0.2
12/07/2021 17:51	54.7	302	9.41	253.2	1.6	6	176	6	0	10.2	14.2	0.2
12/07/2021 17:52	55.3	303	9.40	248.3	1.4	6	164	9	0	10.6	14.4	0.2
12/07/2021 17:53	54.8	304	9.45	251.1	0.9	9	161	10	0	11.1	14.6	0.2
12/07/2021 17:54	55.0	303	9.46	260.2	1.1	9	155	9	0	10.5	14.6	0.2
12/07/2021 17:55	55.5	303	9.29	256.9	0.3	8	172	9	0	10.5	14.3	0.2
12/07/2021 17:56	54.3	303	9.34	254.8	0.3	9	174	10	0	11.4	14.7	0.2
12/07/2021 17:57	52.9	303	9.33	257.8	0.1	12	169	6	0	11.6	15.1	0.2
12/07/2021 17:58	52.4	304	9.58	252.1	0.0	12	179	7	0	11.1	14.9	0.2
12/07/2021 17:59	52.5	304	9.27	249.5	0.2	9	195	8	0	10.6	14.6	0.2
12/07/2021 18:00	52.6	304	9.52	252.8	0.9	9	194	7	0	10.6	14.5	0.2

Group#-Channel#	G7-C35	G7-C37	G7-C40	G7-C39	G7-C3	G7-C24	G7-C12	G7-C28	G7-C8	G7-C17	G7-C1	G7-C2
Long Descrip.	U1-1Min St	U1-1Min Ba	U1-1Min Ca	U1-1Min Li	U1-1Min Am	U1-1Min Ou	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min In	U1-1Min Ou	U1-1Min Au
Short Descrip.	SteamFl	BagHTemp	CarbInj	LimeFlow	NH3 Flow	COHIoc	NOxoc	SO2ic	SO2oc	O2i	O2o	AuxGasFlow
Units	Yes/No	Yes/No	Yes/No	Yes/No	GPH	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	KSCFH
Range	0-100	0-500	0-50	0-1200	0-60	0-50000	0-10000	0-20000	0-2000	0-25	0-25	0-50
12/07/2021 18:01	52.1	304	9.17	252.1	1.1	9	191	8	0	10.5	14.5	0.2
12/07/2021 18:02	50.9	304	9.58	252.9	1.0	6	179	10	0	10.7	14.4	0.2
12/07/2021 18:03	50.7	303	9.32	251.3	0.3	9	176	7	0	10.7	14.7	0.2
12/07/2021 18:04	51.3	303	9.50	252.9	0.8	9	193	10	0	10.7	14.6	0.2
12/07/2021 18:05	52.0	303	9.25	257.6	1.2	9	196	11	0	10.4	14.5	0.2
12/07/2021 18:06	52.3	303	9.29	253.6	1.5	7	197	11	0	10.9	14.6	0.2
12/07/2021 18:07	52.2	303	9.47	255.1	1.7	9	188	11	0	10.6	14.7	0.2
12/07/2021 18:08	52.5	303	9.35	257.8	1.7	8	182	13	0	10.3	14.2	0.2
12/07/2021 18:09	52.3	303	9.27	257.6	1.8	9	183	14	0	10.3	14.4	0.2
12/07/2021 18:10	51.6	303	9.34	253.3	1.8	7	181	15	0	10.7	14.5	0.2
12/07/2021 18:11	51.3	303	9.54	250.0	1.7	9	164	15	0	10.4	14.5	0.2
12/07/2021 18:12												
Period Average =	54.4	310	9.54	253.8	1.0	8	180	22	0	10.0	14.2	0.2
Period Max Value =	58.4	320	17.34	264.2	2.5	12	211	46	0	11.6	15.1	0.2
Period Min Value =	50.1	299	8.99	226.7	0.0	6	155	6	0	8.3	13.4	0.2
Period Totals =	6.9040E+3	3.9358E+4	1.2119E+3	3.2230E+4	1.2180E+2	9.4800E+2	2.2540E+4	2.6930E+3	0.0000E+0	1.2255E+3	1.7755E+3	2.5400E+1
Period % Recovery =	100.0	100.0	100.0	100.0	100.0	97.6	98.4	96.8	98.4	96.9	98.4	100.0

APPENDIX C
LABORATORY ANALYSIS DATA

Appendix C.1
HCl, HF & Multi Metals Analyses

Montrose Air Quality Services, LLC – Portland

13585 NE Whitaker Way
Portland, OR 97230

Covanta Marion, INC.

Unit 1 Acute
Client Project # PROJ-010935

Analytical Report
(1221-086)

EPA Method 26A

Hydrogen chloride, Hydrogen fluoride, Hydrogen bromide, Chlorine, Bromine

EPA Method 29

Aluminum, Iron, Molybdenum, Potassium, Vanadium, Mercury, Phosphorus, Beryllium, Chromium, Manganese, Cobalt, Nickel, Copper, Zinc, Arsenic, Selenium, Silver, Cadmium, Antimony, Barium, Thallium, Lead

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 247 pages.

Quentisha L. Forrester

QA Review Performed by – Quentisha L. Forrester

Digitally signed by Quentisha Forrester
Date: 2022.01.07 18:00:30 -05'00'

Report Issued: 01/07/2022

ENTHALPY
ANALYTICAL

Summary of Results

Enthalpy Analytical

Company: Montrose Air Quality Services, LLC - Portland

Job No.: 1221-086-1 EPA Method 26A Analysis

Client No.: PROJ-010935 Site: Covanta Marion, Inc

Summary Table

Sample ID	Hydrogen Chloride Catch Weight (ug)	Hydrogen Fluoride Catch Weight (ug)
Acute-R1	6,502	22.1 ND
Acute-R2	10,615	22.6 ND

1221-086-1-M26.xlsx

ENTHALPY ANALYTICAL

EPA Method 29 Summary

EA Project #: 1221-086
Client: Montrose Air Quality Services, LLC
Client Project ID: PROJ-010935 - Covanta Marion, Inc. - Unit 1 Acute

Total Micrograms in Sample

Sample	Sb	As	Ba	Be	Cd	Cr
	µg	µg	µg	µg	µg	µg
1-29-Acute - FH	0.272 J	0.500 J	5.57	0.0500 ND	1.47	10.1
1-29-Acute - BH	0.0553 ND	0.277 ND	1.65	0.0111 ND	0.0741 J	0.481
2-29-Acute - FH	0.549 J	0.694 J	5.49	0.0500 ND	0.384 J	8.12
2-29-Acute - BH	0.112 J	0.280 ND	1.59	0.0112 ND	0.155	0.422
Reagent Blank - FH	0.250 ND	0.254 J	6.29	0.0500 ND	0.226 J	1.36
Reagent Blank - BH	0.0546 ND	0.273 ND	0.113 J	0.0109 ND	0.0109 ND	0.0841 ND

QC SUMMARY

	Sb	As	Ba	Be	Cd	Cr
Spike, %Rec. Front	118%	95%	103%	101%	97%	98%
Spike, %Rec. Back	103%	102%	98%	94%	90%	94%
Duplicate, %RPD Front	N/A	N/A	1.5%	N/A	N/A	1.5%
Duplicate, %RPD Back	N/A	N/A	1.8%	N/A	N/A	N/A

EPA Method 29 Summary

EA Project #: 1221-086
Client: Montrose Air Quality Services, LLC
Client Project ID: PROJ-010935 - Covanta Marion, Inc. - Unit 1 Acute

Total Micrograms in Sample

Sample	Co µg	Cu µg	Pb µg	Mn µg	Ni µg	P µg
1-29-Acute - FH	0.218 J	1.14 J	0.613 J	5.18	7.96	3.36 J
1-29-Acute - BH	0.0553 ND	0.851 J	0.537	0.894	0.662	3.18 J
2-29-Acute - FH	0.178 J	1.89 J	0.807 J	8.00	6.20	2.54 J
2-29-Acute - BH	0.0700 J	0.810 J	1.94	8.96	1.12	2.44 J
Reagent Blank - FH	0.0500 ND	0.313 J	0.0100 ND	0.981 J	2.89	2.50 ND
Reagent Blank - BH	0.0546 ND	0.0546 ND	0.0109 ND	0.0939 J	0.101 J	1.42 J

QC SUMMARY

	Co	Cu	Pb	Mn	Ni	P
Spike, %Rec. Front	97%	94%	108%	100%	97%	96%
Spike, %Rec. Back	105%	102%	107%	95%	91%	87%
Duplicate, %RPD Front	N/A	N/A	N/A	1.1%	N/A	N/A
Duplicate, %RPD Back	N/A	N/A	0.5%	0.1%	N/A	N/A

EPA Method 29 Summary

EA Project #: 1221-086
Client: Montrose Air Quality Services, LLC
Client Project ID: PROJ-010935 - Covanta Marion, Inc. - Unit 1 Acute

Total Micrograms in Sample

Sample	Se	Ag	Tl	Zn	Al*	Fe*
	µg	µg	µg	µg	µg	µg
1-29-Acute - FH	0.250 ND	0.151 J	0.100 ND	18.5	155	381
1-29-Acute - BH	0.119 J	0.0745 J	0.0111 ND	8.37 J	12.2	17.7
2-29-Acute - FH	0.250 ND	0.0484 J	0.100 ND	14.9	114	297
2-29-Acute - BH	0.0620 J	0.105 J	0.0112 ND	12.7	11.5	16.9
Reagent Blank - FH	0.250 ND	0.0450 ND	0.100 ND	4.64 J	102	19.4
Reagent Blank - BH	0.0546 ND	0.0546 ND	0.0109 ND	0.0976 J	5.46 ND	2.19 ND

*Element not within EPA Method 29 scope.

QC SUMMARY

	Se	Ag	Tl	Zn	Al*	Fe*
Spike, %Rec. Front	94%	109%	110%	97%	103%	99%
Spike, %Rec. Back	103%	112%	108%	101%	95%	95%
Duplicate, %RPD Front	N/A	N/A	N/A	N/A	N/A	0.8%
Duplicate, %RPD Back	N/A	N/A	N/A	N/A	N/A	0.6%

EPA Method 29 Summary

EA Project #: 1221-086
Client: Montrose Air Quality Services, LLC
Client Project ID: PROJ-010935 - Covanta Marion, Inc. - Unit 1 Acute

Total Micrograms in Sample

Sample	**Mo***	**K***	**V***
	µg	µg	µg
1-29-Acute - FH	11.3	70.0	5.00 ND
1-29-Acute - BH	0.553 ND	22.8	1.11 ND
2-29-Acute - FH	11.2	66.7	5.00 ND
2-29-Acute - BH	0.560 ND	19.4	1.12 ND
Reagent Blank - FH	10.7	48.6	5.00 ND
Reagent Blank - BH	0.546 ND	5.46 ND	1.09 ND

*Element not within EPA Method 29 scope.

QC SUMMARY

	Mo*	**K***	**V***
Spike, %Rec. Front	104%	98%	102%
Spike, %Rec. Back	103%	86%	100%
Duplicate, %RPD Front	N/A	N/A	N/A
Duplicate, %RPD Back	N/A	N/A	N/A

EPA Method 29 Summary

EA Project #: 1221-086
Client: Montrose Air Quality Services, LLC
Client Project ID: PROJ-010935 - Covanta Marion, Inc. - Unit 1 Acute

Total Micrograms of Mercury in Sample

Sample	**Frac 1B** **µg**	**Frac 2B** **µg**	**Frac 3A** **µg**	**Frac 3B** **µg**	**Frac 3C** **µg**
1-29-Acute	0.0250 ND	1.63	0.0255 ND	0.0795 ND	0.116 J
2-29-Acute	0.0260 J	2.41	0.0187 ND	0.0672 ND	0.109 J
Reagent Blank	0.0250 ND	0.148 ND	0.0237 ND	0.0200 ND	0.0647 J

QC SUMMARY

Matrix Spike, % Recovery	103%
Duplicate, RPD	NA

ANALYSIS REPORT

EA Project #: 1221-086
Client: Montrose Air Quality Services, LLC - Portland
Client Project ID: Method 29 Audit Sample

Audit Sample Concentration

Element	Metals on Filter µg/Filter	Metals in Impinger µg/mL
Sb	77.5	2.89
As	104	0.329
Ba	71.9	2.10
Be	73.4	0.111
Cd	54.9	0.437
Cr	65.2	2.40
Co	111	2.89
Cu	64.5	1.12
Pb	93.9	1.30
Mn	52.7	1.43
Ni	66.3	0.225
P	88.2	2.77
Se	58.5	0.756
Ag	58.2	1.17
Tl	81.1	2.92
Zn	67.7	0.216
	Mercury on Filter µg/Filter	Mercury in Impinger ng/mL
Hg	NA	63.8

Results

Enthalpy Analytical

Company: Montrose Air Quality Services, LLC - Portland

Job No.: 1221-086-1 EPA Method 26A Analysis

Client No.: PROJ-010935 Site: Covanta Marion, Inc

Hydrogen Chloride as Chloride

Sample ID	Filename #1	Filename #2	MDL (ug/mL)	Curve Min. (ug/mL)	Curve Max. (ug/mL)	Ret. Time (min.)	Ret. Time (min.)	%diff. RT	Conc. # 1 (ug/mL)	Conc. # 2 (ug/mL)	%diff. conc.	Avg. Conc. (ug/mL)	DF	Liquid Vol. (mL)	Conv. Factor	Catch Weight (ug)	Flag	pH
M26A Acute R1	049	050	0.0499	0.499	30.6	4.66	4.65	0.0	15.0	15.1	0.2	15.1	1	420	1.028	6,502		0
M26A Acute R2	055	056	0.0499	0.499	30.6	4.66	4.66	0.0	23.9	24.1	0.2	24.0	1	430	1.028	10,615		0

Hydrogen Fluoride as Fluoride

Sample ID	Filename #1	Filename #2	MDL (ug/mL)	Curve Min. (ug/mL)	Curve Max. (ug/mL)	Ret. Time (min.)	Ret. Time (min.)	%diff. RT	Conc. # 1 (ug/mL)	Conc. # 2 (ug/mL)	%diff. conc.	Avg. Conc. (ug/mL)	DF	Liquid Vol. (mL)	Conv. Factor	Catch Weight (ug)	Flag	pH
M26A Acute R1	049	050	0.0499	0.499	30.6				0.0499	0.0499		0.0499	1	420	1.053	22.1	ND	0
M26A Acute R2	055	056	0.0499	0.499	30.6				0.0499	0.0499		0.0499	1	430	1.053	22.6	ND	0

Enthalpy Analytical

Company: Montrose Air Quality Services, LLC - Portland

Job No.: 1221-086-1 EPA Method 26A Analysis

Client No.: PROJ-010935 Site: Covanta Marion, Inc

Matrix Spike Recovery

Enthalpy Sample ID	Compound	Filename #1	Filename #2	Ret. Time (min.)	Ret. Time (min.)	%diff. RT	Conc. # 1 (ug/mL)	Conc. # 2 (ug/mL)	%diff. conc.	Avg. Conc. (ug/mL)	DF	Vol. (mL)	Catch Weight (ug)	Flag
1221-086.MS-Acute-R1.H2SO4	Chloride	051	052	4.66	4.66	0.0	19.4	19.5	0.1	19.4	1	0.8	15.5	
										Native Amount (ug):			11.4	
										Mass Spiked:			4.00	
										Recovery (%):			103	
1221-086.MSD-Acute-R1.H2SO4	Chloride	053	054	4.66	4.66	0.0	19.4	19.4	0.0	19.4	1	0.8	15.5	
										Native Amount (ug):			11.4	
										Mass Spiked:			4.00	
										Recovery (%):			102	
1221-086.MS-Acute-R1.H2SO4	Fluoride	051	052	3.16	3.16	0.0	4.83	4.87	0.4	4.85	1	0.8	3.88	
										Native Amount (ug):			0	
										Mass Spiked:			4.00	
										Recovery (%):			97.0	
1221-086.MSD-Acute-R1.H2SO4	Fluoride	053	054	3.16	3.16	0.0	4.86	4.84	0.2	4.85	1	0.8	3.88	
										Native Amount (ug):			0	
										Mass Spiked:			4.00	
										Recovery (%):			97.0	

Method 29 Analysis Run Summary Calculations

Element	Sb 121	Methodology	ICP-MS	
Client	MAQS	MDL	0.50	µg/L
EA Project No.	1221-086	LOQ	5.0	µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	0.54	2.72	100	5		0.2720	J
2-29-Acute	1221-086.2	-1A	1.10	5.49	100	5		0.5490	J
Reagent Blank	1221-086.3	-1A	0.07	0.34	100	5		0.2500	ND
Lab Blank Front	1221-086.LB	-1A	0.42	0.42	100	1		0.0500	ND
LCS Front	1221-086.LCS	-1A	56.34	112.68	100	2	% REC =	112.7%	
Spike Front	1221-086.1S	-1A	59.30	296.51	100	5	% REC =	117.5%	
Duplicate Front	1221-086.2D	-1A	1.08				RPD =	N/A	

Element	Sb 121	Methodology	ICP-MS	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	5.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	0.07	0.34	100	5	522	472	0.0553	ND
2-29-Acute	1221-086.2	-2A	0.20	1.00	100	5	465	415	0.1123	J
Reagent Blank	1221-086.3	-2A	0.01	0.07	100	5	295	270	0.0546	ND
Lab Blank Back	1221-086.LB	-2A	0.06	0.06	100	1			0.0100	ND
LCS Back	1221-086.LCS	-2A	50.40	100.80	100	2		% REC =	100.8%	
Spike Back	1221-086.1S	-2A	51.38	256.89	100	5		% REC =	102.8%	
Duplicate Back	1221-086.2D	-2A	0.20					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	As 75	Methodology	ICP-MS	
Client	MAQS	MDL	0.50	µg/L
EA Project No.	1221-086	LOQ	5.0	µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	1.00	5.00	100	5		0.5003	J
2-29-Acute	1221-086.2	-1A	1.39	6.94	100	5		0.6943	J
Reagent Blank	1221-086.3	-1A	0.51	2.54	100	5		0.2540	J
Lab Blank Front	1221-086.LB	-1A	1.73	1.73	100	1		0.1726	J
LCS Front	1221-086.LCS	-1A	49.58	99.15	100	2	% REC =	99.2%	
Spike Front	1221-086.1S	-1A	48.54	242.68	100	5	% REC =	95.1%	
Duplicate Front	1221-086.2D	-1A	0.74				RPD =	N/A	

Element	As 75	Methodology	ICP-MS	
Client	MAQS	MDL	0.50	µg/L
EA Project No.	1221-086	LOQ	5.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	0.09	0.45	100	5	522	472	0.2765	ND
2-29-Acute	1221-086.2	-2A	0.12	0.60	100	5	465	415	0.2801	ND
Reagent Blank	1221-086.3	-2A	0.00	0.00	100	5	295	270	0.2731	ND
Lab Blank Back	1221-086.LB	-2A	0.14	0.14	100	1			0.0500	ND
LCS Back	1221-086.LCS	-2A	49.48	98.96	100	2		% REC =	99.0%	
Spike Back	1221-086.1S	-2A	50.98	254.89	100	5		% REC =	102.0%	
Duplicate Back	1221-086.2D	-2A	0.04					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Ba 455	Methodology	ICP-OES	
Client	MAQS	MDL	0.91	µg/L
EA Project No.	1221-086	LOQ	2.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	11.14	55.70	100	5		5.5700	
2-29-Acute	1221-086.2	-1A	10.98	54.90	100	5		5.4900	
Reagent Blank	1221-086.3	-1A	12.57	62.85	100	5		6.2850	
Lab Blank Front	1221-086.LB	-1A	-0.08	-0.08	100	1		0.0910	ND
LCS Front	1221-086.LCS	-1A	99.55	99.55	100	1	% REC =	99.6%	
Spike Front	1221-086.1S	-1A	523.90	2619.50	100	5	% REC =	102.6%	
Duplicate Front	1221-086.2D	-1A	11.14				RPD =	1.45%	

Element	Ba 455	Methodology	ICP-OES	
Client	MAQS	MDL	0.20	µg/L
EA Project No.	1221-086	LOQ	2.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)		Total (µg)	
BACK HALVES											
1-29-Acute	1221-086.1	-2A	14.90	14.90	100	1	522	472		1.6478	
2-29-Acute	1221-086.2	-2A	14.15	14.15	100	1	465	415		1.5855	
Reagent Blank	1221-086.3	-2A	1.04	1.04	100	1	295	270		0.1133	J
Lab Blank Back	1221-086.LB	-2A	-0.20	-0.20	100	1				0.0200	ND
LCS Back	1221-086.LCS	-2A	100.10	100.10	100	1			% REC =	100.1%	
Spike Back	1221-086.1S	-2A	506.50	506.50	100	1			% REC =	98.3%	
Duplicate Back	1221-086.2D	-2A	14.41						RPD =	1.82%	

Method 29 Analysis Run Summary Calculations

Element	Be 313	Methodology	ICP-OES	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES								
1-29-Acute	1221-086.1 -1A	0.02	0.08	100	5		0.0500	ND
2-29-Acute	1221-086.2 -1A	0.01	0.07	100	5		0.0500	ND
Reagent Blank	1221-086.3 -1A	0.00	0.02	100	5		0.0500	ND
Lab Blank Front	1221-086.LB -1A	0.09	0.09	100	1		0.0100	ND
LCS Front	1221-086.LCS -1A	93.40	93.40	100	1	% REC =	93.4%	
Spike Front	1221-086.1S -1A	502.60	2513.00	100	5	% REC =	100.5%	
Duplicate Front	1221-086.2D -1A	0.00				RPD =	N/A	

Element	Be 313	Methodology	ICP-OES	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)		Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1 -2A	-0.01	-0.01	100	1	522	472		0.0111	ND
2-29-Acute	1221-086.2 -2A	-0.03	-0.03	100	1	465	415		0.0112	ND
Reagent Blank	1221-086.3 -2A	-0.01	-0.01	100	1	295	270		0.0109	ND
Lab Blank Back	1221-086.LB -2A	-0.02	-0.02	100	1				0.0100	ND
LCS Back	1221-086.LCS -2A	95.35	95.35	100	1			% REC =	95.4%	
Spike Back	1221-086.1S -2A	469.30	469.30	100	1			% REC =	93.9%	
Duplicate Back	1221-086.2D -2A	0.02						RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Cd 214	Methodology	ICP-OES	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES								
1-29-Acute	1221-086.1 -1A	2.94	14.68	100	5		1.4675	
2-29-Acute	1221-086.2 -1A	0.77	3.84	100	5		0.3838	J
Reagent Blank	1221-086.3 -1A	0.45	2.26	100	5		0.2259	J
Lab Blank Front	1221-086.LB -1A	-0.02	-0.02	100	1		0.0100	ND
LCS Front	1221-086.LCS -1A	93.07	93.07	100	1	% REC =	93.1%	
Spike Front	1221-086.1S -1A	486.40	2432.00	100	5	% REC =	96.7%	
Duplicate Front	1221-086.2D -1A	0.77				RPD =	N/A	

Element	Cd 214	Methodology	ICP-OES	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)		Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1 -2A	0.67	0.67	100	1	522	472		0.0741	J
2-29-Acute	1221-086.2 -2A	1.39	1.39	100	1	465	415		0.1552	
Reagent Blank	1221-086.3 -2A	-0.08	-0.08	100	1	295	270		0.0109	ND
Lab Blank Back	1221-086.LB -2A	-0.05	-0.05	100	1				0.0100	ND
LCS Back	1221-086.LCS -2A	95.15	95.15	100	1			% REC =	95.2%	
Spike Back	1221-086.1S -2A	449.90	449.90	100	1			% REC =	89.8%	
Duplicate Back	1221-086.2D -2A	1.43						RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Cr 267	Methodology	ICP-OES	
Client	MAQS	MDL	0.54	µg/L
EA Project No.	1221-086	LOQ	2.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES								
1-29-Acute	1221-086.1 -1A	20.10	100.50	100	5		10.0500	
2-29-Acute	1221-086.2 -1A	16.24	81.20	100	5		8.1200	
Reagent Blank	1221-086.3 -1A	2.72	13.61	100	5		1.3610	
Lab Blank Front	1221-086.LB -1A	-0.17	-0.17	100	1		0.0540	ND
LCS Front	1221-086.LCS -1A	96.71	96.71	100	1	% REC =	96.7%	
Spike Front	1221-086.1S -1A	509.90	2549.50	100	5	% REC =	98.0%	
Duplicate Front	1221-086.2D -1A	16.49				RPD =	1.53%	

Element	Cr 267	Methodology	ICP-OES	
Client	MAQS	MDL	0.77	µg/L
EA Project No.	1221-086	LOQ	2.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)		Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1 -2A	4.35	4.35	100	1	522	472		0.4813	
2-29-Acute	1221-086.2 -2A	3.77	3.77	100	1	465	415		0.4222	
Reagent Blank	1221-086.3 -2A	0.51	0.51	100	1	295	270		0.0841	ND
Lab Blank Back	1221-086.LB -2A	0.05	0.05	100	1				0.0770	ND
LCS Back	1221-086.LCS -2A	98.60	98.60	100	1			% REC =	98.6%	
Spike Back	1221-086.1S -2A	476.50	476.50	100	1			% REC =	94.4%	
Duplicate Back	1221-086.2D -2A	4.02						RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Co 59	Methodology	ICP-MS
Client	MAQS	MDL	0.10 µg/L
EA Project No.	1221-086	LOQ	1.0 µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50 µg/L
		Analyst(s)	MAL

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	0.44	2.18	100	5		0.2176	J
2-29-Acute	1221-086.2	-1A	0.36	1.78	100	5		0.1776	J
Reagent Blank	1221-086.3	-1A	0.08	0.41	100	5		0.0500	ND
Lab Blank Front	1221-086.LB	-1A	0.07	0.07	100	1		0.0100	ND
LCS Front	1221-086.LCS	-1A	55.56	111.12	100	2	% REC =	111.1%	
Spike Front	1221-086.1S	-1A	49.14	245.68	100	5	% REC =	97.4%	
Duplicate Front	1221-086.2D	-1A	0.34				RPD =	N/A	

Element	Co 59	Methodology	ICP-MS
Client	MAQS	MDL	0.10 µg/L
EA Project No.	1221-086	LOQ	1.0 µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50 µg/L
		Analyst(s)	MAL

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)		Total (µg)	
BACK HALVES											
1-29-Acute	1221-086.1	-2A	0.08	0.41	100	5	522	472		0.0553	ND
2-29-Acute	1221-086.2	-2A	0.13	0.63	100	5	465	415		0.0700	J
Reagent Blank	1221-086.3	-2A	0.00	0.02	100	5	295	270		0.0546	ND
Lab Blank Back	1221-086.LB	-2A	0.04	0.04	100	1				0.0100	ND
LCS Back	1221-086.LCS	-2A	53.92	107.84	100	2		% REC =		107.8%	
Spike Back	1221-086.1S	-2A	52.54	262.70	100	5		% REC =		105.1%	
Duplicate Back	1221-086.2D	-2A	0.10					RPD =		N/A	

1221-086 worksheet

Method 29 Analysis Run Summary Calculations

Element Cu 63
Client MAQS
EA Project No. 1221-086
Analysis Date 12/28/2021

Methodology ICP-MS
MDL 0.50 µg/L
LOQ 5.0 µg/L
Postdig'n Spike Conc. 50 µg/L
Analyst(s) MAL

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	2.28	11.40	100	5		1.1396	J
2-29-Acute	1221-086.2	-1A	3.78	18.90	100	5		1.8901	J
Reagent Blank	1221-086.3	-1A	0.63	3.13	100	5		0.3130	J
Lab Blank Front	1221-086.LB	-1A	0.66	0.66	100	1		0.0657	J
LCS Front	1221-086.LCS	-1A	53.42	106.84	100	2	% REC =	106.8%	
Spike Front	1221-086.1S	-1A	49.16	245.80	100	5	% REC =	93.8%	
Duplicate Front	1221-086.2D	-1A	3.55				RPD =	N/A	

Element Cu 63
Client MAQS
EA Project No. 1221-086
Analysis Date 12/29/2021

Methodology ICP-MS
MDL 0.10 µg/L
LOQ 5.0 µg/L
Postdig'n Spike Conc. 50 µg/L
Analyst(s) MAL

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	1.54	7.69	100	5	522	472	0.8505	J
2-29-Acute	1221-086.2	-2A	1.45	7.23	100	5	465	415	0.8099	J
Reagent Blank	1221-086.3	-2A	0.07	0.33	100	5	295	270	0.0546	ND
Lab Blank Back	1221-086.LB	-2A	0.05	0.05	100	1			0.0100	ND
LCS Back	1221-086.LCS	-2A	50.65	101.29	100	2		% REC =	101.3%	
Spike Back	1221-086.1S	-2A	52.65	263.23	100	5		% REC =	102.2%	
Duplicate Back	1221-086.2D	-2A	1.36					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Pb 208	Methodology		ICP-MS
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	0.61	6.13	100	10		0.6130	J
2-29-Acute	1221-086.2	-1A	0.81	8.07	100	10		0.8070	J
Reagent Blank	1221-086.3	-1A	0.10	0.95	100	10		0.1000	ND
Lab Blank Front	1221-086.LB	-1A	0.00	0.00	100	1		0.0100	ND
LCS Front	1221-086.LCS	-1A	53.68	107.36	100	2	% REC =	107.4%	
Spike Front	1221-086.1S	-1A	54.66	546.55	100	10	% REC =	108.1%	
Duplicate Front	1221-086.2D	-1A	0.79				RPD =	N/A	

Element	Pb 208	Methodology		ICP-MS
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	4.86	4.86	100	1	522	472	0.537	
2-29-Acute	1221-086.2	-2A	17.33	17.3	100	1	465	415	1.941	
Reagent Blank	1221-086.3	-2A	0.08	0.08	100	1	295	270	0.0109	ND
Lab Blank Back	1221-086.LB	-2A	0.00	0.00	100	1			0.0100	ND
LCS Back	1221-086.LCS	-2A	54.25	108.49	100	2		% REC =	108.5%	
Spike Back	1221-086.1S	-2A	58.46	58.5	100	1		% REC =	107.2%	
Duplicate Back	1221-086.2D	-2A	17.23					RPD =	0.54%	

Method 29 Analysis Run Summary Calculations

Element	Mn 257	Methodology	ICP-OES	
Client	MAQS	MDL	0.20	µg/L
EA Project No.	1221-086	LOQ	2.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	10.35	51.75	100	5		5.1750	
2-29-Acute	1221-086.2	-1A	16.00	80.00	100	5		8.0000	
Reagent Blank	1221-086.3	-1A	1.96	9.81	100	5		0.9805	J
Lab Blank Front	1221-086.LB	-1A	0.09	0.09	100	1		0.0200	ND
LCS Front	1221-086.LCS	-1A	96.68	96.68	100	1	% REC =	96.7%	
Spike Front	1221-086.1S	-1A	510.50	2552.50	100	5	% REC =	100.0%	
Duplicate Front	1221-086.2D	-1A	16.17				RPD =	1.06%	

Element	Mn 257	Methodology	ICP-OES	
Client	MAQS	MDL	0.20	µg/L
EA Project No.	1221-086	LOQ	2.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	8.08	8.08	100	1	522	472	0.8935	
2-29-Acute	1221-086.2	-2A	79.98	79.98	100	1	465	415	8.9616	
Reagent Blank	1221-086.3	-2A	0.86	0.86	100	1	295	270	0.0939	J
Lab Blank Back	1221-086.LB	-2A	0.11	0.11	100	1			0.0200	ND
LCS Back	1221-086.LCS	-2A	98.31	98.31	100	1		% REC =	98.3%	
Spike Back	1221-086.1S	-2A	484.80	484.80	100	1		% REC =	95.3%	
Duplicate Back	1221-086.2D	-2A	79.88					RPD =	0.13%	

Method 29 Analysis Run Summary Calculations

Element	Ni 231	Methodology	ICP-OES	
Client	MAQS	MDL	1.30	µg/L
EA Project No.	1221-086	LOQ	5.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	**EA ID**		**Test Sol'n (µg/L)**	**Dig'te Conc (µg/L)**	**FV (mL)**	**Dil'n Factor**		**Total (µg)**	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	15.92	79.60	100	5		7.9600	
2-29-Acute	1221-086.2	-1A	12.39	61.95	100	5		6.1950	
Reagent Blank	1221-086.3	-1A	5.78	28.90	100	5		2.8900	
Lab Blank Front	1221-086.LB	-1A	0.23	0.23	100	1		0.1300	ND
LCS Front	1221-086.LCS	-1A	94.49	94.49	100	1	% REC =	94.5%	
Spike Front	1221-086.1S	-1A	501.10	2505.50	100	5	% REC =	97.0%	
Duplicate Front	1221-086.2D	-1A	12.49				RPD =	N/A	

Element	Ni 231	Methodology	ICP-OES	
Client	MAQS	MDL	0.56	µg/L
EA Project No.	1221-086	LOQ	5.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	**EA ID**		**Test Sol'n (µg/L)**	**Dig'te Conc (µg/L)**	**FV (mL)**	**Dil'n Factor**	**Total Volume (mL)**	**Volume Dig'd (mL)**	**Total (µg)**	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	5.99	5.99	100	1	522	472	0.6622	
2-29-Acute	1221-086.2	-2A	9.97	9.97	100	1	465	415	1.1169	
Reagent Blank	1221-086.3	-2A	0.92	0.92	100	1	295	270	0.1007	J
Lab Blank Back	1221-086.LB	-2A	-0.26	-0.26	100	1			0.0560	ND
LCS Back	1221-086.LCS	-2A	96.12	96.12	100	1		% REC =	96.1%	
Spike Back	1221-086.1S	-2A	461.30	461.30	100	1		% REC =	91.1%	
Duplicate Back	1221-086.2D	-2A	9.88					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	P 177	Methodology	ICP-OES	
Client	MAQS	MDL	5.00	µg/L
EA Project No.	1221-086	LOQ	50.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	6.72	33.62	100	5		3.3620	J
2-29-Acute	1221-086.2	-1A	5.08	25.40	100	5		2.5400	J
Reagent Blank	1221-086.3	-1A	2.34	11.69	100	5		2.5000	ND
Lab Blank Front	1221-086.LB	-1A	1.67	1.67	100	1		0.5000	ND
LCS Front	1221-086.LCS	-1A	95.25	95.25	100	1	% REC =	95.3%	
Spike Front	1221-086.1S	-1A	488.70	2443.50	100	5	% REC =	96.4%	
Duplicate Front	1221-086.2D	-1A	4.11				RPD =	N/A	

Element	P 177	Methodology	ICP-OES	
Client	MAQS	MDL	5.00	µg/L
EA Project No.	1221-086	LOQ	50.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	28.73	28.73	100	1	522	472	3.1773	J
2-29-Acute	1221-086.2	-2A	21.78	21.78	100	1	465	415	2.4404	J
Reagent Blank	1221-086.3	-2A	12.99	12.99	100	1	295	270	1.4193	J
Lab Blank Back	1221-086.LB	-2A	3.70	3.70	100	1			0.5000	ND
LCS Back	1221-086.LCS	-2A	98.33	98.33	100	1		% REC =	98.3%	
Spike Back	1221-086.1S	-2A	462.60	462.60	100	1		% REC =	86.8%	
Duplicate Back	1221-086.2D	-2A	20.78					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element Se 77
Client MAQS
EA Project No. 1221-086
Analysis Date 12/28/2021

Methodology ICP-MS
MDL 0.50 µg/L
LOQ 5.0 µg/L
Postdig'n Spike Conc. 50 µg/L
Analyst(s) MAL

Client ID	**EA ID**		**Test Sol'n (µg/L)**	**Dig'te Conc (µg/L)**	**FV (mL)**	**Dil'n Factor**		**Total (µg)**	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	0.27	1.36	100	5		0.2500	ND
2-29-Acute	1221-086.2	-1A	0.16	0.81	100	5		0.2500	ND
Reagent Blank	1221-086.3	-1A	0.14	0.71	100	5		0.2500	ND
Lab Blank Front	1221-086.LB	-1A	0.08	0.08	100	1		0.0500	ND
LCS Front	1221-086.LCS	-1A	51.72	103.44	100	2	% REC =	103.4%	
Spike Front	1221-086.1S	-1A	47.13	235.65	100	5	% REC =	94.3%	
Duplicate Front	1221-086.2D	-1A	0.28				RPD =	N/A	

Element Se 77
Client MAQS
EA Project No. 1221-086
Analysis Date 12/29/2021

Methodology ICP-MS
MDL 0.10 µg/L
LOQ 5.0 µg/L
Postdig'n Spike Conc. 50 µg/L
Analyst(s) MAL

Client ID	**EA ID**		**Test Sol'n (µg/L)**	**Dig'te Conc (µg/L)**	**FV (mL)**	**Dil'n Factor**	**Total Volume (mL)**	**Volume Dig'd (mL)**		**Total (µg)**	
BACK HALVES											
1-29-Acute	1221-086.1	-2A	0.22	1.08	100	5	522	472		0.1192	J
2-29-Acute	1221-086.2	-2A	0.11	0.55	100	5	465	415		0.0620	J
Reagent Blank	1221-086.3	-2A	0.00	0.00	100	5	295	270		0.0546	ND
Lab Blank Back	1221-086.LB	-2A	0.17	0.17	100	1				0.0167	J
LCS Back	1221-086.LCS	-2A	50.64	101.28	100	2			% REC =	101.3%	
Spike Back	1221-086.1S	-2A	51.86	259.28	100	5			% REC =	103.3%	
Duplicate Back	1221-086.2D	-2A	0.12						RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Ag 107	Methodology	ICP-MS	
Client	MAQS	MDL	0.090	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	0.30	1.51	100	5		0.1508	J
2-29-Acute	1221-086.2	-1A	0.10	0.48	100	5		0.0484	J
Reagent Blank	1221-086.3	-1A	0.03	0.16	100	5		0.0450	ND
Lab Blank Front	1221-086.LB	-1A	0.07	0.07	100	1		0.0090	ND
LCS Front	1221-086.LCS	-1A	55.64	111.28	100	2	% REC =	111.3%	
Spike Front	1221-086.1S	-1A	54.85	274.23	100	5	% REC =	109.1%	
Duplicate Front	1221-086.2D	-1A	0.07				RPD =	N/A	

Element	Ag 107	Methodology	ICP-MS	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	0.13	0.67	100	5	522	472	0.0745	J
2-29-Acute	1221-086.2	-2A	0.19	0.94	100	5	465	415	0.1050	J
Reagent Blank	1221-086.3	-2A	0.03	0.13	100	5	295	270	0.0546	ND
Lab Blank Back	1221-086.LB	-2A	0.06	0.06	100	1			0.0100	ND
LCS Back	1221-086.LCS	-2A	51.23	102.46	100	2		% REC =	102.5%	
Spike Back	1221-086.1S	-2A	56.24	281.21	100	5		% REC =	112.2%	
Duplicate Back	1221-086.2D	-2A	0.15					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Tl 205	Methodology	ICP-MS	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES								
1-29-Acute	1221-086.1 -1A	0.00	0.00	100	10		0.1000	ND
2-29-Acute	1221-086.2 -1A	0.00	0.00	100	10		0.1000	ND
Reagent Blank	1221-086.3 -1A	0.00	0.00	100	10		0.1000	ND
Lab Blank Front	1221-086.LB -1A	0.00	0.00	100	1		0.0100	ND
LCS Front	1221-086.LCS -1A	56.09	112.17	100	2	% REC =	112.2%	
Spike Front	1221-086.1S -1A	55.14	551.35	100	10	% REC =	110.3%	
Duplicate Front	1221-086.2D -1A	0.00				RPD =	N/A	

Element	Tl 205	Methodology	ICP-MS	
Client	MAQS	MDL	0.10	µg/L
EA Project No.	1221-086	LOQ	1.0	µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES									
1-29-Acute	1221-086.1 -2A	0.05	0.05	100	1	522	472	0.0111	ND
2-29-Acute	1221-086.2 -2A	0.05	0.05	100	1	465	415	0.0112	ND
Reagent Blank	1221-086.3 -2A	0.01	0.01	100	1	295	270	0.0109	ND
Lab Blank Back	1221-086.LB -2A	0.01	0.01	100	1			0.0100	ND
LCS Back	1221-086.LCS -2A	54.66	109.33	100	2		% REC =	109.3%	
Spike Back	1221-086.1S -2A	53.94	53.94	100	1		% REC =	107.9%	
Duplicate Back	1221-086.2D -2A	0.03					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Zn 66	Methodology		ICP-MS
Client	MAQS	MDL	2.50	µg/L
EA Project No.	1221-086	LOQ	20.0	µg/L
Analysis Date	12/28/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	37.07	185.36	100	5		18.5355	
2-29-Acute	1221-086.2	-1A	29.77	148.83	100	5		14.8831	
Reagent Blank	1221-086.3	-1A	9.28	46.40	100	5		4.6404	J
Lab Blank Front	1221-086.LB	-1A	0.96	0.96	100	1		0.2500	ND
LCS Front	1221-086.LCS	-1A	48.32	96.65	100	2	% REC =	96.6%	
Spike Front	1221-086.1S	-1A	85.31	426.55	100	5	% REC =	96.5%	
Duplicate Front	1221-086.2D	-1A	29.27				RPD =	N/A	

Element	Zn 66	Methodology		ICP-MS
Client	MAQS	MDL	0.88	µg/L
EA Project No.	1221-086	LOQ	20.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	50	µg/L
		Analyst(s)	MAL	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	15.14	75.68	100	5	522	472	8.3700	J
2-29-Acute	1221-086.2	-2A	22.63	113.15	100	5	465	415	12.6783	
Reagent Blank	1221-086.3	-2A	1.79	8.93	100	5	295	270	0.9758	J
Lab Blank Back	1221-086.LB	-2A	0.00	0.00	100	1			0.0880	ND
LCS Back	1221-086.LCS	-2A	43.41	86.82	100	2		% REC =	86.8%	
Spike Back	1221-086.1S	-2A	65.64	328.20	100	5		% REC =	101.0%	
Duplicate Back	1221-086.2D	-2A	21.46					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	Al 167	Methodology		ICP-OES
Client	MAQS	MDL	50.0	µg/L
EA Project No.	1221-086	LOQ	50.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	310.80	1554.00	100	5		155.4000	
2-29-Acute	1221-086.2	-1A	227.00	1135.00	100	5		113.5000	
Reagent Blank	1221-086.3	-1A	204.30	1021.50	100	5		102.1500	
Lab Blank Front	1221-086.LB	-1A	30.02	30.02	100	1		5.0000	ND
LCS Front	1221-086.LCS	-1A	115.70	115.70	100	1	% REC =	115.7%	
Spike Front	1221-086.1S	-1A	824.50	4122.50	100	5	% REC =	102.7%	
Duplicate Front	1221-086.2D	-1A	231.10				RPD =	N/A	

Element	Al 167	Methodology		ICP-OES
Client	MAQS	MDL	50.0	µg/L
EA Project No.	1221-086	LOQ	50.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	110.60	110.60	100	1	522	472	12.2316	
2-29-Acute	1221-086.2	-2A	102.60	102.60	100	1	465	415	11.4961	
Reagent Blank	1221-086.3	-2A	7.826	7.83	100	1	295	270	5.4630	ND
Lab Blank Back	1221-086.LB	-2A	-1.03	-1.03	100	1			5.0000	ND
LCS Back	1221-086.LCS	-2A	99.77	99.77	100	1		% REC =	99.8%	
Spike Back	1221-086.1S	-2A	587.10	587.10	100	1		% REC =	95.3%	
Duplicate Back	1221-086.2D	-2A	102.90					RPD =	N/A	

1221-086 worksheet

Method 29 Analysis Run Summary Calculations

Element	Fe 238	Methodology	ICP-OES	
Client	MAQS	MDL	20.0	µg/L
EA Project No.	1221-086	LOQ	20.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	761.30	3806.50	100	5		380.6500	
2-29-Acute	1221-086.2	-1A	593.60	2968.00	100	5		296.8000	
Reagent Blank	1221-086.3	-1A	38.86	194.30	100	5		19.4300	
Lab Blank Front	1221-086.LB	-1A	5.08	5.08	100	1		2.0000	ND
LCS Front	1221-086.LCS	-1A	102.00	102.00	100	1	% REC =	102.0%	
Spike Front	1221-086.1S	-1A	1255.00	6275.00	100	5	% REC =	98.7%	
Duplicate Front	1221-086.2D	-1A	598.40				RPD =	0.81%	

Element	Fe 238	Methodology	ICP-OES	
Client	MAQS	MDL	20.0	µg/L
EA Project No.	1221-086	LOQ	20.0	µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	159.80	159.80	100	1	522	472	17.6728	
2-29-Acute	1221-086.2	-2A	150.50	150.50	100	1	465	415	16.8633	
Reagent Blank	1221-086.3	-2A	13.71	13.71	100	1	295	270	2.1852	ND
Lab Blank Back	1221-086.LB	-2A	0.53	0.53	100	1			2.0000	ND
LCS Back	1221-086.LCS	-2A	100.70	100.70	100	1		% REC =	100.7%	
Spike Back	1221-086.1S	-2A	635.40	635.40	100	1		% REC =	95.1%	
Duplicate Back	1221-086.2D	-2A	151.40					RPD =	0.60%	

Method 29 Analysis Run Summary Calculations

Element Mo 202
Client MAQS
EA Project No. 1221-086
Analysis Date 12/27/2021

Methodology ICP-OES
MDL 5.0 µg/L
LOQ 5.0 µg/L
Postdig'n Spike Conc. 500 µg/L
Analyst(s) CAS

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	22.55	112.75	100	5		11.2750	
2-29-Acute	1221-086.2	-1A	22.45	112.25	100	5		11.2250	
Reagent Blank	1221-086.3	-1A	21.48	107.40	100	5		10.7400	
Lab Blank Front	1221-086.LB	-1A	0.05	0.05	100	1		0.5000	ND
LCS Front	1221-086.LCS	-1A	96.79	96.79	100	1	% REC =	96.8%	
Spike Front	1221-086.1S	-1A	542.10	2710.50	100	5	% REC =	103.9%	
Duplicate Front	1221-086.2D	-1A	23.16				RPD =	N/A	

Element Mo 202
Client MAQS
EA Project No. 1221-086
Analysis Date 12/27/2021

Methodology ICP-OES
MDL 5.0 µg/L
LOQ 5.0 µg/L
Postdig'n Spike Conc. 500 µg/L
Analyst(s) CAS

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	0.62	0.62	100	1	522	472	0.5530	ND
2-29-Acute	1221-086.2	-2A	0.47	0.47	100	1	465	415	0.5602	ND
Reagent Blank	1221-086.3	-2A	0.38	0.38	100	1	295	270	0.5463	ND
Lab Blank Back	1221-086.LB	-2A	0.24	0.24	100	1			0.5000	ND
LCS Back	1221-086.LCS	-2A	100.80	100.80	100	1		% REC =	100.8%	
Spike Back	1221-086.1S	-2A	514.70	514.70	100	1		% REC =	102.9%	
Duplicate Back	1221-086.2D	-2A	0.45					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	K 766	Methodology	ICP-OES	
Client	MAQS	MDL	50.0	µg/L
EA Project No.	1221-086	LOQ	50.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	140.00	700.00	100	5		70.0000	
2-29-Acute	1221-086.2	-1A	133.40	667.00	100	5		66.7000	
Reagent Blank	1221-086.3	-1A	97.21	486.05	100	5		48.6050	
Lab Blank Front	1221-086.LB	-1A	-2.61	-2.61	100	1		5.0000	ND
LCS Front	1221-086.LCS	-1A	84.30	84.30	100	1	% REC =	84.3%	
Spike Front	1221-086.1S	-1A	628.20	3141.00	100	5	% REC =	97.6%	
Duplicate Front	1221-086.2D	-1A	132.70				RPD =	N/A	

Element	K 766	Methodology	ICP-OES	
Client	MAQS	MDL	50.0	µg/L
EA Project No.	1221-086	LOQ	50.0	µg/L
Analysis Date	12/29/2021	Postdig'n Spike Conc.	500	µg/L
		Analyst(s)	CAS	

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total (µg)	
BACK HALVES										
1-29-Acute	1221-086.1	-2A	206.50	206.50	100	1	522	472	22.8375	
2-29-Acute	1221-086.2	-2A	173.40	173.40	100	1	465	415	19.4292	
Reagent Blank	1221-086.3	-2A	18.92	18.92	100	1	295	270	5.4630	ND
Lab Blank Back	1221-086.LB	-2A	-0.02	-0.02	100	1			5.0000	ND
LCS Back	1221-086.LCS	-2A	85.93	85.93	100	1		% REC =	85.9%	
Spike Back	1221-086.1S	-2A	634.80	634.80	100	1		% REC =	85.7%	
Duplicate Back	1221-086.2D	-2A	172.40					RPD =	N/A	

Method 29 Analysis Run Summary Calculations

Element	V 292	Methodology	ICP-OES
Client	MAQS	MDL	10.0 µg/L
EA Project No.	1221-086	LOQ	10.0 µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500 µg/L
		Analyst(s)	CAS

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor		Total (µg)	
FRONT HALVES									
1-29-Acute	1221-086.1	-1A	0.14	0.68	100	5		5.0000	ND
2-29-Acute	1221-086.2	-1A	-0.24	-1.20	100	5		5.0000	ND
Reagent Blank	1221-086.3	-1A	-0.31	-1.56	100	5		5.0000	ND
Lab Blank Front	1221-086.LB	-1A	0.03	0.03	100	1		1.0000	ND
LCS Front	1221-086.LCS	-1A	95.88	95.88	100	1	% REC =	95.9%	
Spike Front	1221-086.1S	-1A	511.70	2558.50	100	5	% REC =	102.3%	
Duplicate Front	1221-086.2D	-1A	-0.31				RPD =	N/A	

Element	V 292	Methodology	ICP-OES
Client	MAQS	MDL	10.0 µg/L
EA Project No.	1221-086	LOQ	10.0 µg/L
Analysis Date	12/27/2021	Postdig'n Spike Conc.	500 µg/L
		Analyst(s)	CAS

Client ID	EA ID		Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)		Total (µg)	
BACK HALVES											
1-29-Acute	1221-086.1	-2A	0.44	0.44	100	1	522	472		1.1059	ND
2-29-Acute	1221-086.2	-2A	0.03	0.03	100	1	465	415		1.1205	ND
Reagent Blank	1221-086.3	-2A	0.24	0.24	100	1	295	270		1.0926	ND
Lab Blank Back	1221-086.LB	-2A	-0.15	-0.15	100	1				1.0000	ND
LCS Back	1221-086.LCS	-2A	99.25	99.25	100	1			% REC =	99.3%	
Spike Back	1221-086.1S	-2A	501.10	501.10	100	1			% REC =	100.2%	
Duplicate Back	1221-086.2D	-2A	0.02						RPD =	N/A	

METHOD 29 MERCURY

CVAA ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

MDL = 0.050 µg/L
RL = 0.10 µg/L
Matrix spike conc. = 5.00 µg/L

Client: MAQS
EA Project #: 1221-086
Analysis Date: 12/17/21, 12/20/21, 12/23/21

Sample ID		Test	Dig'te		Dil'n	Total	Volume		
Client	EA	Sol'n	Conc	FV	Factor	Volume	Dig'd	Total	
		µg/L	µg/L	ml		ml	ml	µg	
FRACTION 1B									
1-29-Acute	1221-086.1 -1B	0.026	0.03	50	1	100	10.0	0.0250	ND
2-29-Acute	1221-086.2 -1B	0.052	0.05	50	1	100	10.0	0.0260	J
Reagent Blank	1221-086.3 -1B	0.024	0.02	50	1	100	10.0	0.0250	ND
FRACTION 2B									
1-29-Acute	1221-086.1 -2B	0.312	0.31	50	1	522	5.0	1.6286	
2-29-Acute	1221-086.2 -2B	0.518	0.52	50	1	465	5.0	2.4087	
Reagent Blank	1221-086.3 -2B	0.012	0.01	50	1	295	5.0	0.1475	ND
FRACTION 3A									
1-29-Acute	1221-086.1 -3A	0.026	0.03	50	1	102	10.0	0.0255	ND
2-29-Acute	1221-086.2 -3A	0.020	0.02	50	1	75	10.0	0.0187	ND
Reagent Blank	1221-086.3 -3A	0.006	0.01	50	1	95	10.0	0.0237	ND
FRACTION 3B									
1-29-Acute	1221-086.1 -3B	0.028	0.03	50	1	318	10.0	0.0795	ND
2-29-Acute	1221-086.2 -3B	0.017	0.02	50	1	269	10.0	0.0672	ND
Reagent Blank	1221-086.3 -3B	0.027	0.03	50	1	80	10.0	0.0200	ND
Matrix Spike	1221-086.1S -3B	5.130				% REC =	102.6%		
Duplicate	1221-086.2D -3B	0.027				% RPD =	N/A		

METHOD 29 MERCURY

CVAA ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

MDL = 0.050 µg/L
RL = 0.10 µg/L
Matrix spike conc. = 5.00 µg/L

Client: MAQS
EA Project #: 1221-086
Analysis Date: 12/17/21, 12/20/21, 12/23/21

Sample ID		Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dil'n Factor	Total Volume ml	Volume Dig'd ml	Total µg	
Client	EA								
FRACTION 3C									
1-29-Acute	1221-086.1 -3C	0.076	0.08	50	1	306	10.0	0.1163	J
2-29-Acute	1221-086.2 -3C	0.082	0.08	50	1	265	10.0	0.1087	J
Reagent Blank	1221-086.3 -3C	0.053	0.05	50	1	244	10.0	0.0647	J
Batch Quality Control									
Lab Blank	1221-086.LB1	0.005	0.01	50	1	50	20	0.0062	ND
Lab Control Sample	1221-086.LCS1	5.100				% REC =	102.0%		
Lab Blank	1221-086.LB2	0.026	0.03	50	1	50	20	0.0062	ND
Lab Control Sample	1221-086.LCS2	5.050				% REC =	101.0%		
Lab Blank	1221-086.LB3	0.021	0.02	50	1	50	20	0.0062	ND
Lab Control Sample	1221-086.LCS3	4.950				% REC =	99.0%		

Antimony 121

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/30/21

RL = 5.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	38.8	775.1	100	20	100	77.5	
Metals in Impinger	1221-086.4-2A	57.8	2888.7	100	50	100	288.9	2.889

Arsenic 75

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/29/21

RL = 5.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	51.9	1038.9	100	20	100	103.9	
Metals in Impinger	1221-086.4-2A	16.4	328.9	100	20	100	32.9	0.329

1221-086 Metals Audit worksheet

Barium 455

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/27/21

RL = 2.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	143.7	718.5	100	5	100	71.9	
Metals in Impinger	1221-086.4-2A	418.9	2094.5	100	5	100	209.5	2.095

Berylium 313

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/27/21

RL = 1.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	146.5	732.5	100	5	100	73.3	
Metals in Impinger	1221-086.4-2A	22.2	110.9	100	5	100	11.1	0.111

Cadmium 214

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/27/21

RL = 1.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test Sol'n	Dig'te Conc	FV	Dilution Factor	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml		ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	109.7	548.5	100	5	100	54.9	
Metals in Impinger	1221-086.4-2A	87.5	437.3	100	5	100	43.7	0.437

Chromium 267

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/27/21

RL = 2.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	130.3	651.5	100	5	100	65.2	
Metals in Impinger	1221-086.4-2A	479.5	2397.5	100	5	100	239.8	2.398

Cobalt 59

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/30/21

RL = 1.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	55.5	1110.5	100	20	100	111.1	
Metals in Impinger	1221-086.4-2A	57.7	2886.0	100	50	100	288.6	2.886

1221-086 Metals Audit worksheet

Copper 63

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/29/21

RL = 5.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	32.3	645.3	100	20	100	64.5	
Metals in Impinger	1221-086.4-2A	56.1	1122.4	100	20	100	112.2	1.122

1221-086 Metals Audit worksheet

Lead 208

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21

RL = 1.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	47.0	939.4	100	20	100	93.9	
Metals in Impinger	1221-086.4-2A	26.0	1300.1	100	50	100	130.0	1.300

1221-086 Metals Audit worksheet

Manganese 257

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/27/21

RL = 2.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	105.3	526.5	100	5	100	52.7	
Metals in Impinger	1221-086.4-2A	284.9	1424.5	100	5	100	142.5	1.425

Nickel 231

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/27/21

RL = 5.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	132.5	662.5	100	5	100	66.3	
Metals in Impinger	1221-086.4-2A	45.1	225.4	100	5	100	22.5	0.225

Phosphorus 177

ICP-OES ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/29/21

RL = 50.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	176.4	882.0	100	5	100	88.2	
Metals in Impinger	1221-086.4-2A	553.2	2766.0	100	5	100	276.6	2.766

Selenium 77

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/29/21

RL = 5.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	 EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	29.2	584.5	100	20	100	58.5	
Metals in Impinger	1221-086.4-2A	37.8	755.8	100	20	100	75.6	0.756

Silver 107

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/29/21

RL = 1.0 µg/L
LCS = 100.0 µg/L

Sample ID Client	EA	Test Sol'n µg/L	Dig'te Conc µg/L	FV ml	Dilution Factor	Int. Vol ml	Total µg	Conc µg/mL
Metals on Filter	1221-086.4-1A	29.1	582.3	100	20	100	58.2	
Metals in Impinger	1221-086.4-2A	58.4	1167.5	100	20	100	116.8	1.168

Thallium 205

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland
EA Project #: 1221-086
Analysis Date: 12/28/21, 12/29/21

RL = 1.0 µg/L
LCS = 100.0 µg/L

Sample ID		Test	Dig'te					
		Sol'n	Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	40.5	811.0	100	20	100	81.1	
Metals in Impinger	1221-086.4-2A	58.4	2918.0	100	50	100	291.8	2.918

1221-086 Metals Audit worksheet

Zinc 66

ICP-MS ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS - Portland	RL =	20.0	µg/L
EA Project #: 1221-086	LCS =	100.0	µg/L
Analysis Date: 12/28/21, 12/30/21			

Sample ID		Test Sol'n	Dig'te Conc	FV	Dilution	Int. Vol	Total	Conc
Client	EA	µg/L	µg/L	ml	Factor	ml	µg	µg/mL
Metals on Filter	1221-086.4-1A	33.9	677.0	100	20	100	67.7	
Metals in Impinger	1221-086.4-2A	43.2	216.2	100	5	100	21.6	0.216

1221-086 Metals Audit worksheet

METHOD M29 MERCURY

CVAA ANALYSIS RUN SUMMARY AND CALCULATION WORKSHEET

Client: MAQS
EA Proj. #: 1221-086
Analysis Date: 12/20/21

RL = 0.10 µg/L
Spike conc. = 5.00 µg/L

Sample ID Client	EA	Test Sol'n (µg/L)	Dig'te Conc (µg/L)	FV (mL)	Dil'n Factor	Total Volume (mL)	Volume Dig'd (mL)	Total Hg	
Hg on Filter	1221-086.5-1B	NA	#VALUE!	100		50		#VALUE!	ug/filter
Hg in Impinger	1221-086.5-2B	3.19	31.9		10	50	25	63.80	ng/mL

1221-086 Hg Audit

Narrative Summary

Enthalpy Analytical Narrative Summary

Company Montrose Air Quality Services, LLC
Job No. 1221-086 EPA Method 29
Client ID. PROJ-010935 – Covanta Marion, Inc. – Unit 1 Acute

Custody

Alyssa Miller received the samples on 12/10/21 at a temperature of 13.7 ˚C after being relinquished by Montrose Air Quality Services, LLC. The samples were received in good condition with the exception of the mercury on filter paper audit vial which was received broken.

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

Preparation and Analysis

The samples were prepared and analyzed for antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, phosphorus, selenium, silver, thallium, zinc, aluminum, iron, molybdenum, potassium, vanadium, and mercury using the procedures found in EPA Method 29, *Determination of Metals Emissions from Stationary Sources.* Aluminum, iron, molybdenum, potassium, and vanadium are not in the Method 29 scope and the analysis performed for the samples is not considered accredited / certified.

The Agilent Model 7700x, Inductively Coupled Plasma Mass Spectrometer “U” (Serial No.: JP13512898), The Thermo Scientific Model 6300 Duo Inductively Coupled Plasma Optical Emission Spectrometer “O” (Serial No.: IC3D20122203), and The Teledyne Cetac Model QuickTrace M-7600, Cold Vapor Atomic Absorption Spectrometer “Walt Jr.” (Serial No.: 031401Q76) were used for these analyses.

Calibration

The calibration curves met all method-specified precision criteria.

QC Notes

The analytes of interest were not identified at concentrations greater than the reporting limit in the analyses of the laboratory blanks. All of the analytes of interest for the Laboratory Control Spikes were within the acceptance limits of 80% to 120%. All of the Matrix Spike recoveries were within the acceptance range of 75% to 125%. All of the required duplicate samples had a relative percent difference of 20% or less or were less than five times the limit of quantitation. All of the samples were analyzed at least in duplicate.

Enthalpy Analytical Narrative Summary

Company	Montrose Air Quality Services, LLC
Job No.	1221-086 EPA Method 29
Client ID.	PROJ-010935 – Covanta Marion, Inc. – Unit 1 Acute

QC Notes (Cont.)	The positive interference check for potassium failed high due to an ionization effect from the high concentration of multiple salts in the interference standard mix. All other quality control parameters passed for potassium.
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.

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Sample Custody

MONTROSE
AIR QUALITY SERVICES

CHAIN OF CUSTODY

Portland Location
13585 NE Whitaker Way
Portland, OR 97230
(503) 255-5050

Lab info:
Enthalpy Analytical
Durham NC

Client / Project: Covanta Marion, Inc	**Project / Sample Location:** Stack ~~2~~ 1 Acute EC 12/8	**Test / Analytical Method:** EPA 26A (halides)
Project No.: PROJ-010935	**Purchase Order No:**	**Special Analysis / Reporting Instructions:** HCl, HF
Send Analytical Report To: Portland QA/QC: : PortlandQA-QC@montrose-env.com pbecker@montrose-env.com / echetty@montrose	**Sampler or PM Signature:**	

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-26A-Acute	12.7.21	15:10	1	Container 3 - [KO], Impingers 1 & 2 contents, rinses	0.1N H2SO4	
2-26A-Acute	12.7.21	17:45	1	Same as Run 1	"	
~~3-26A-Acute~~	—	—	1	~~Same as Run 1~~	"	
~~FB-26A-Acute~~	—	—	1	~~Field blank - same containers as Run 1~~	"	
~~RB-H2SO4-Acute~~	—	—	~~1~~	~~H2SO4 reagent blank~~	0.1N H2SO4	
~~RB-DI-Acute~~	—	—	~~1~~	~~DI reagent Blank~~	DI	
13.7°C Raytek 2 good condition AMM3	12.10.21					
Total Containers			6			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
Peter Baker	12.9.21	15:06	Alyssa M Miller	12.10.21	1015	13.7

Key: [KO] = Knockout impinger, "[ ]" denotes an option in the method, FB = Field Blank, RB = Reagent Blank

MAQS Chain of Custody Macro-R4

MONTROSE
AIR QUALITY SERVICES

CHAIN OF CUSTODY

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

Lab info:
Enthalpy Analytical
Durham, NC

Client / Project: Covanta Marion, INC.

Project No.: PROJ-010935

Send Analytical Report To: Portland QA/QC: PortlandQA-QC@montrose-env.com
pbecker@montrose-env.com

Project / Sample Location: Unit 1 Acute

Purchase Order No:

Sampler or PM Signature: Peter Becker

Test / Analytical Method: EPA 29 (multiple metals)

Special Analysis / Detection Limit / Reporting Instructions: Full Siute plus Al, Fe, Mo, K & V

Run / Sample No.	Date	Time	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-29-Acute	12.7.21	16:29	1	Container 1 - filter	--	
"	12.7.21	16:34	1	Container 3 - front-half rinse	0.1N HNO3	
"	12.7.21	16:47	1	Container 4 - [KO], Impingers 1 & 2 contents, rinses	5% HNO3 / 10% H2O2	
"	12.7.21	16:54	1	Container 5a - Impinger 3 contents and rinse	0.1N HNO3	
"	12.7.21	17:12	1 Ⓑ	Container 5b - Impingers 4 & 5 contents and rinses	10% H2SO4 / 4% KMnO4	
"	12.7.21	17:31	1	Container 5c - Impingers 4 & 5 acid rinse	8N HCl	
2-29-Acute	12.7.21	19:38	6	Same as Run 1	"	
Audit Sample	12.7.21	20:00	2	Hg on Filtr / Hg in solution		
Audit Sample	12.7.21	20:00	2	Metals on Filtr / metals in Solution		
RB-MM-8a/b	12.7.21	13:20/13:21	2	Containers 8a/b - 0.1N HNO3, water reagent blanks	0.1N HNO3, water	13.7°C Raytek.
RB-MM-9	12.7.21	13:42	1	Container 9 - HNO3 / H2O2 reagent blank	5% HNO3 / 10% H2O2	good conditi
RB-MM-10	12.7.21	13:51	1 Ⓑ	Container 10 - H2SO4 / KMnO4 reagent blank	10% H2SO4 / 4% KMnO4	AMM3 12.10.21
RB-MM-11	12.7.21	14:01	1	Container 11 - 8N HCl reagent blank	8N HCl	Ⓑ Not Rcd R1-2, Blan
RB-MM-12	12.7.21	14:06	1	Container 12 - filters (3) reagent blank	--	AMM3 12.10.21
Total Containers			~~18~~ 22			

Relinquished by	Date	Time	Received by	Date	Time	Temp.
Pete Becker	12.9.21	16:14	Alyssa M Miller	12.10.21	1015	13.7
			Ⓑ Alyssa M Miller	12.15.21	1130	16.9

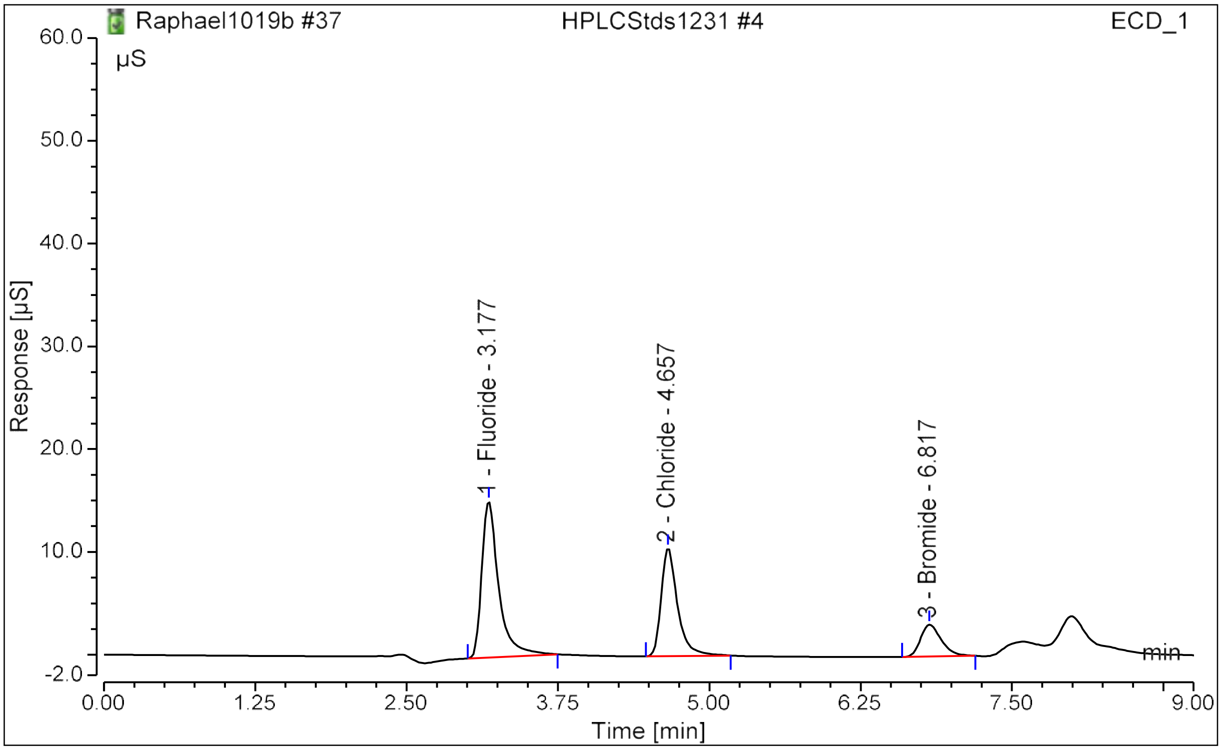
Key: [KO] = Knockout impinger, "[ ]" denotes an option in the method, FB = Field Blank, RB = Reagent Blank

MAQS Chain of Custody Macro-

Raw Data

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 20:37**	Run Time:	**14.50**

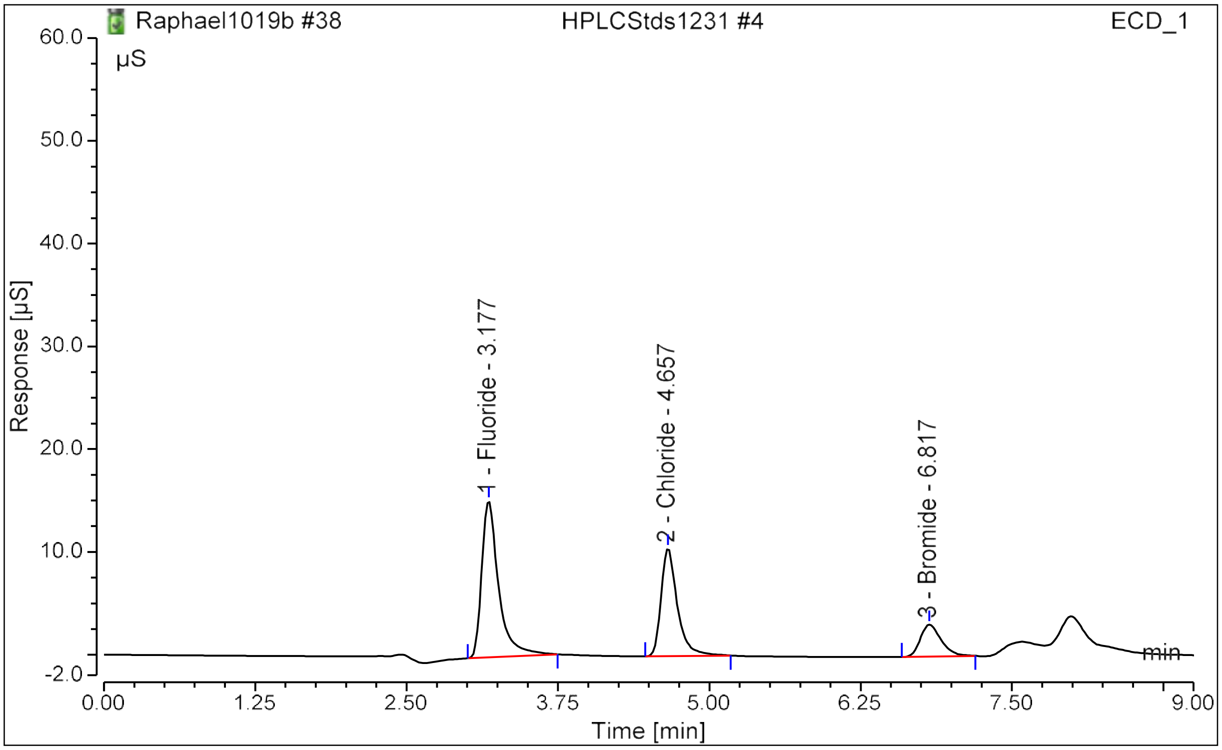


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	2.462	15.201	10.03481	FALSE	FALSE
2	4.66	Chloride	1.648	10.507	9.94951	FALSE	FALSE
3	6.82	Bromide	0.620	3.112	10.06521	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 20:53**	Run Time:	**14.50**

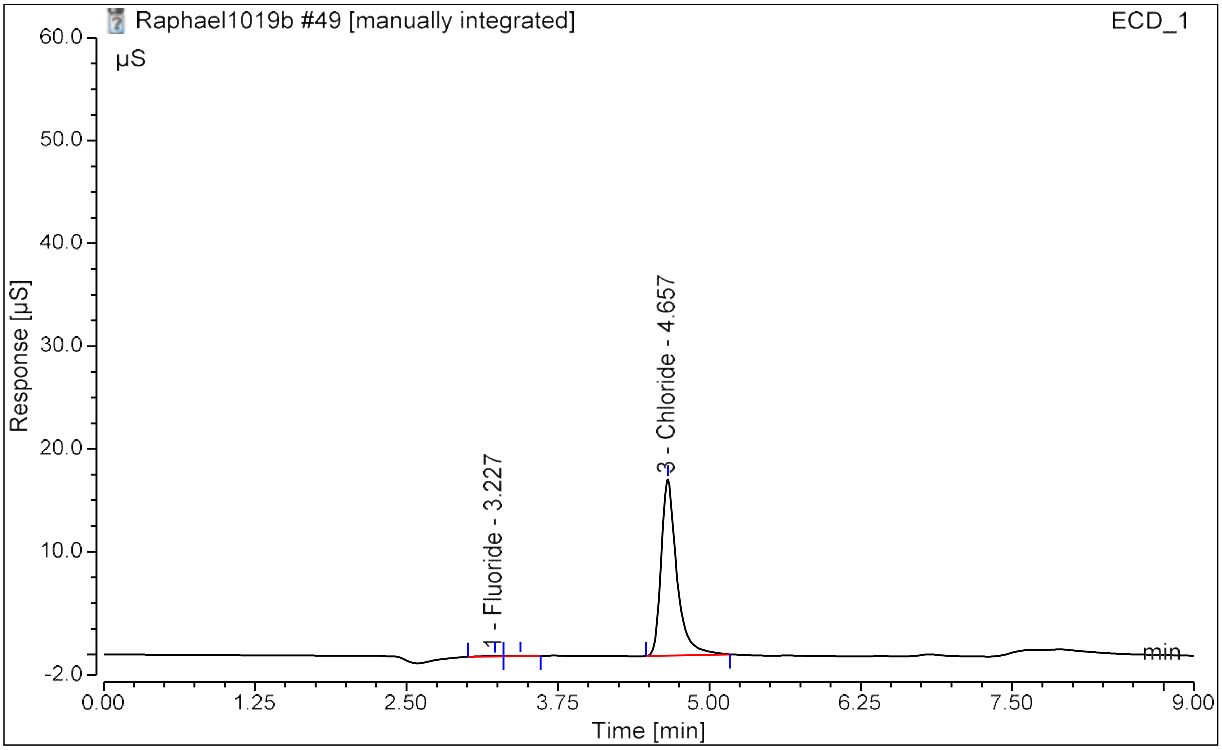


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	2.463	15.237	10.03776	FALSE	FALSE
2	4.66	Chloride	1.641	10.478	9.91008	FALSE	FALSE
3	6.82	Bromide	0.619	3.107	10.05639	FALSE	FALSE

Peak Analysis Report

Sample Name:	**1221-086.Acute-R1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 23:51**	Run Time:	**14.50**

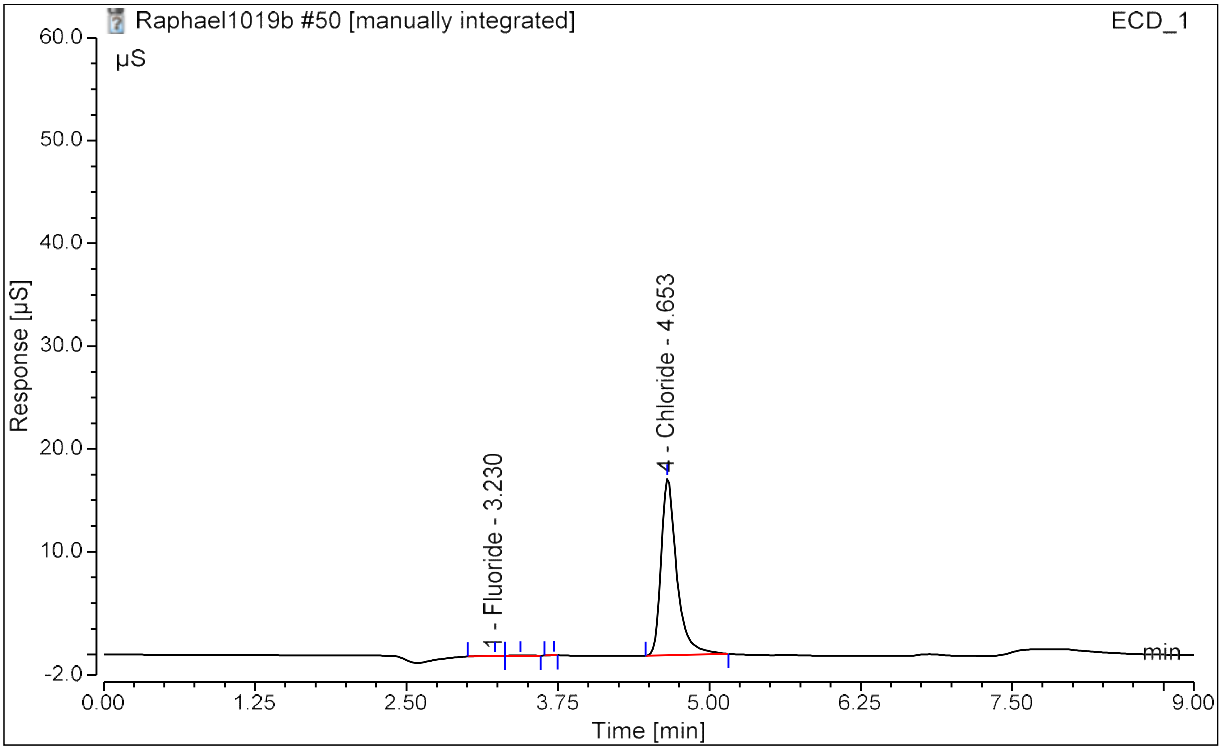


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.23	Fluoride	0.011	0.051	0.01433	FALSE	TRUE
3	4.66	Chloride	2.564	17.137	15.02654	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.Acute-R1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 00:07**	Run Time:	**14.50**

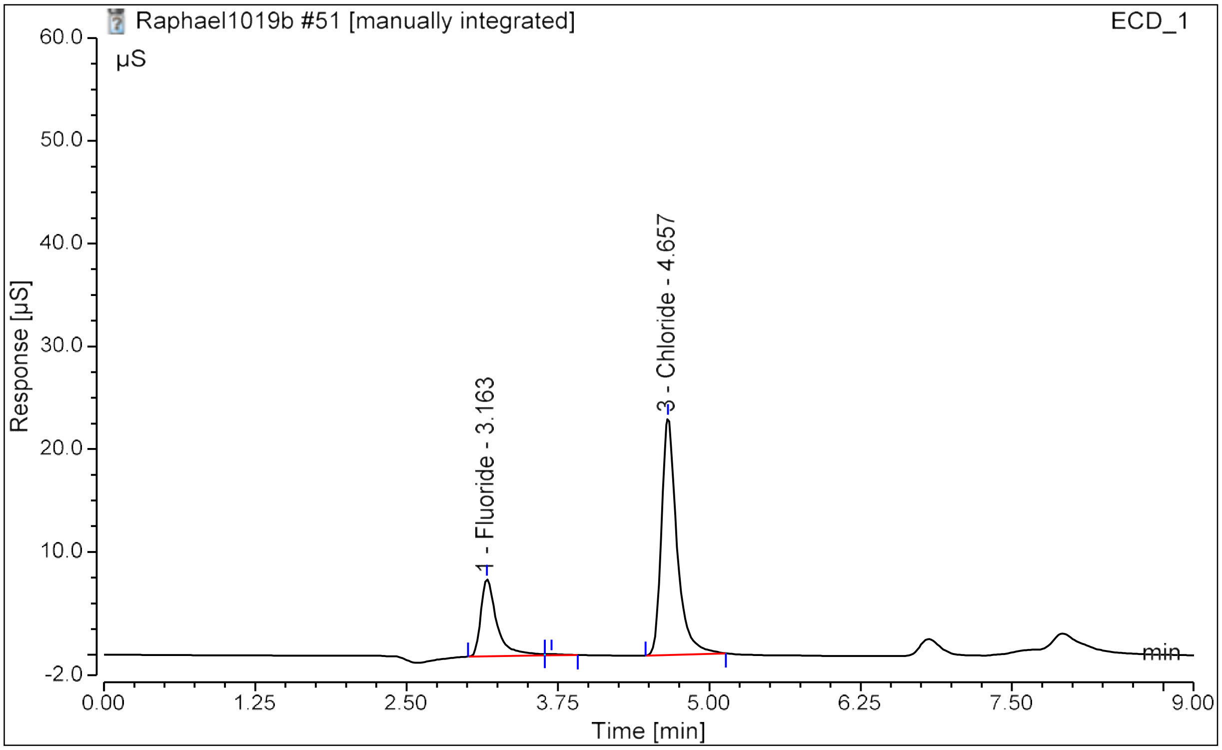


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.23	Fluoride	0.011	0.051	0.01677	FALSE	TRUE
4	4.65	Chloride	2.574	17.201	15.07999	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.MS-Acute-R1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 00:24**	Run Time:	**14.50**

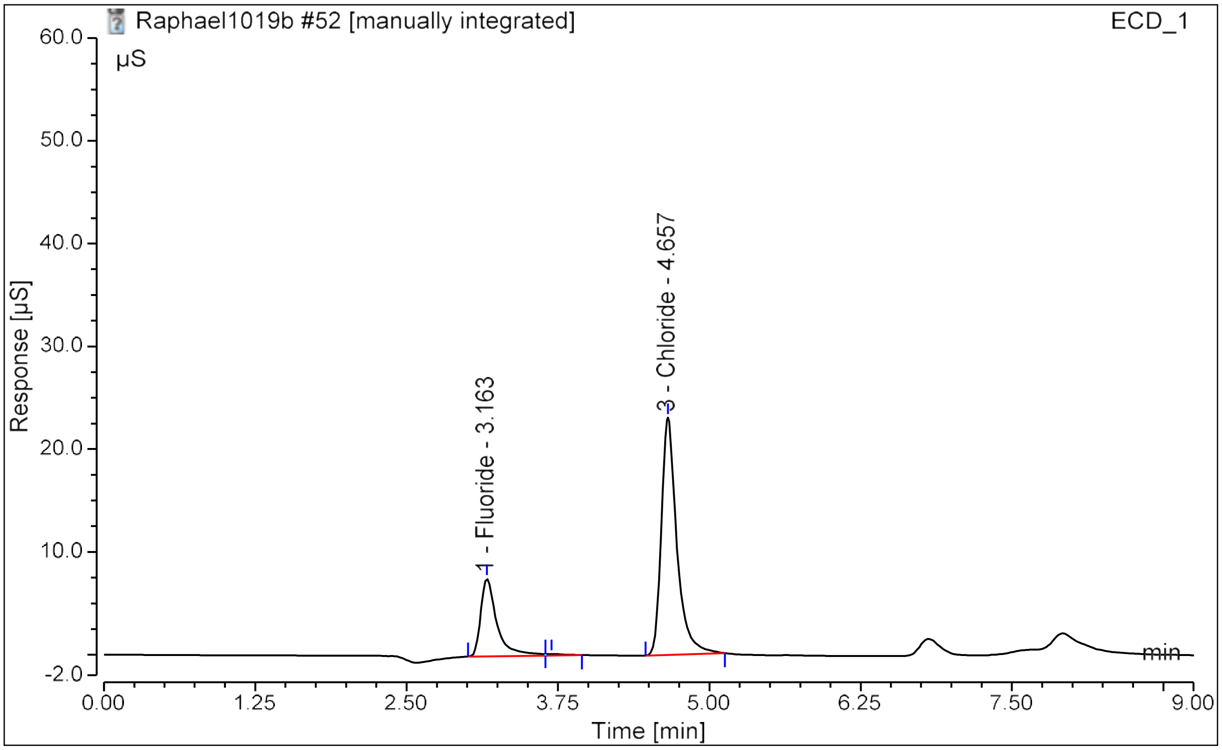


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.16	Fluoride	1.167	7.520	4.83154	FALSE	TRUE
3	4.66	Chloride	3.403	23.034	19.41629	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.MS-Acute-R1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 00:40**	Run Time:	**14.50**

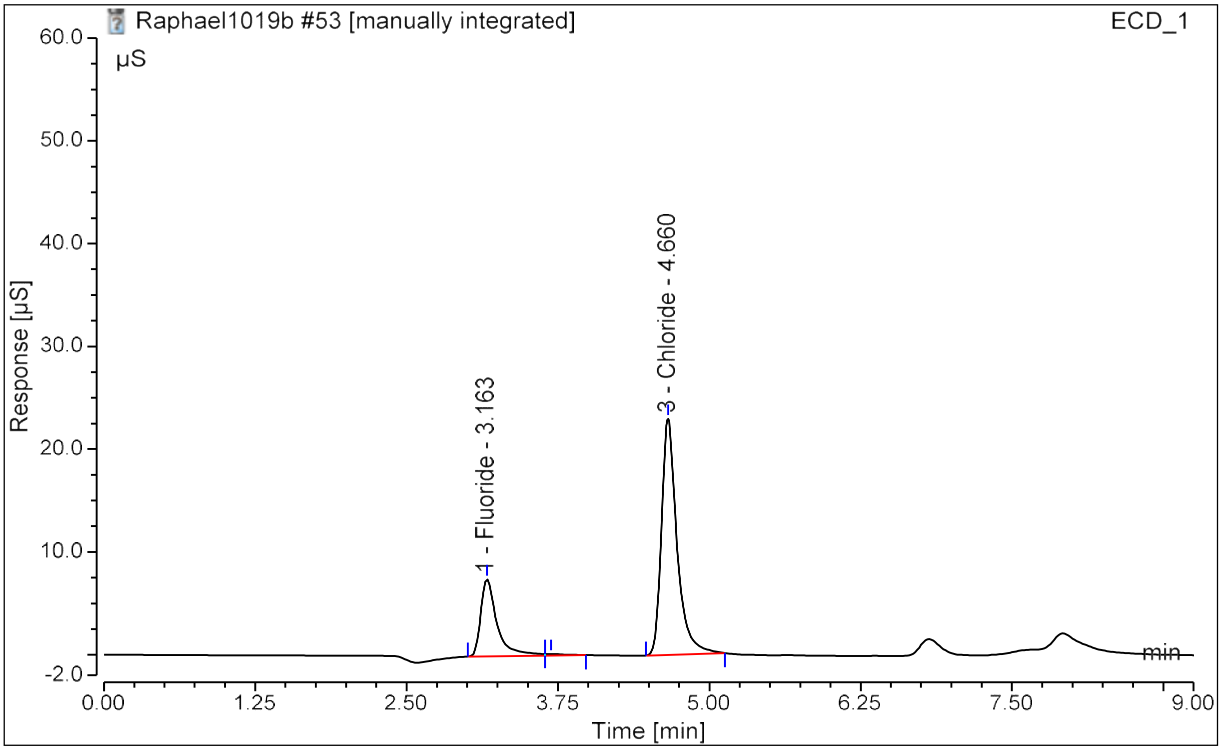


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.16	Fluoride	1.176	7.547	4.86890	FALSE	TRUE
3	4.66	Chloride	3.411	23.108	19.45355	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.MSD-Acute-R1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 00:56**	Run Time:	**14.50**

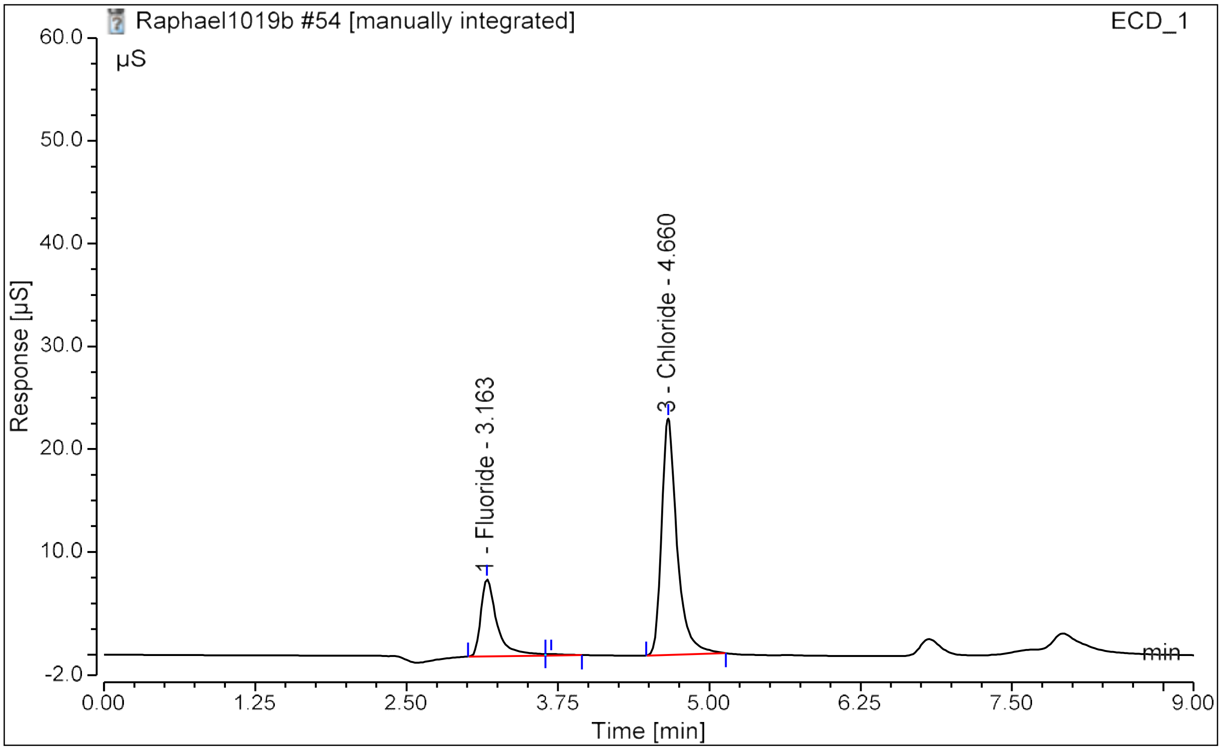


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.16	Fluoride	1.173	7.512	4.85529	FALSE	TRUE
3	4.66	Chloride	3.396	22.995	19.37707	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.MSD-Acute-R1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 01:12**	Run Time:	**14.50**

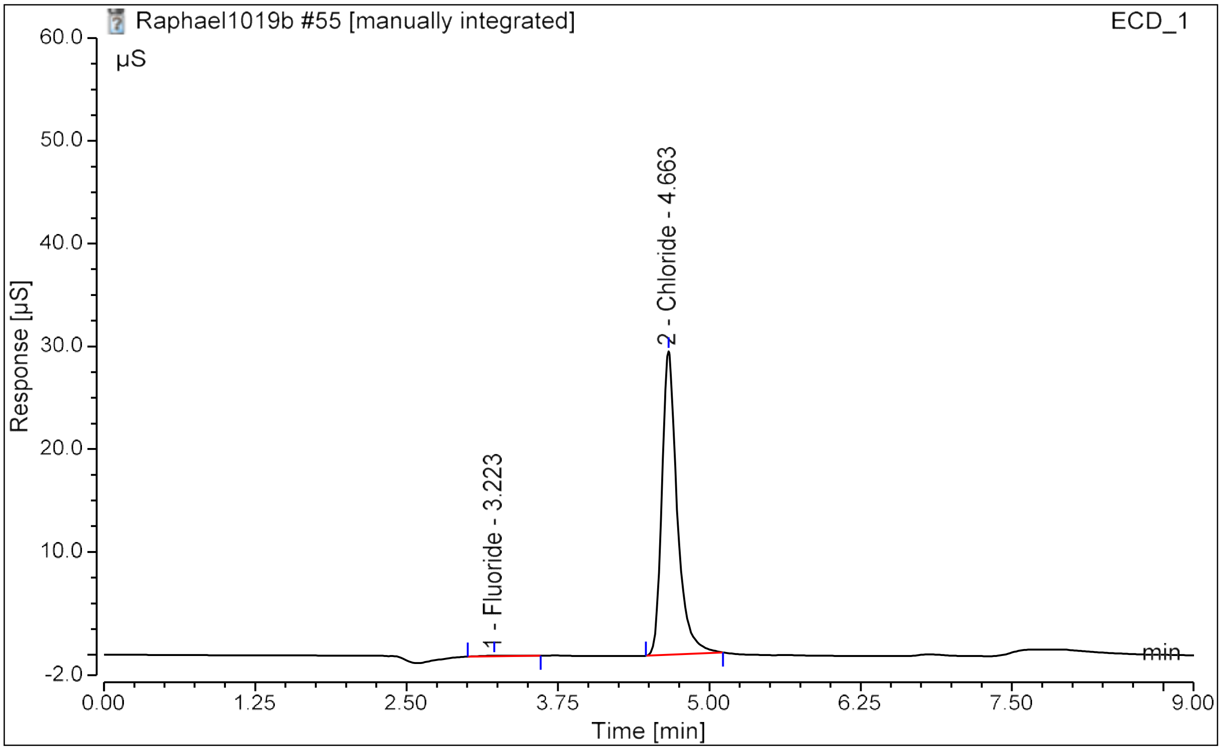


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.16	Fluoride	1.169	7.509	4.84049	FALSE	TRUE
3	4.66	Chloride	3.398	23.009	19.38892	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.Acute-R2.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 01:28**	Run Time:	**14.50**

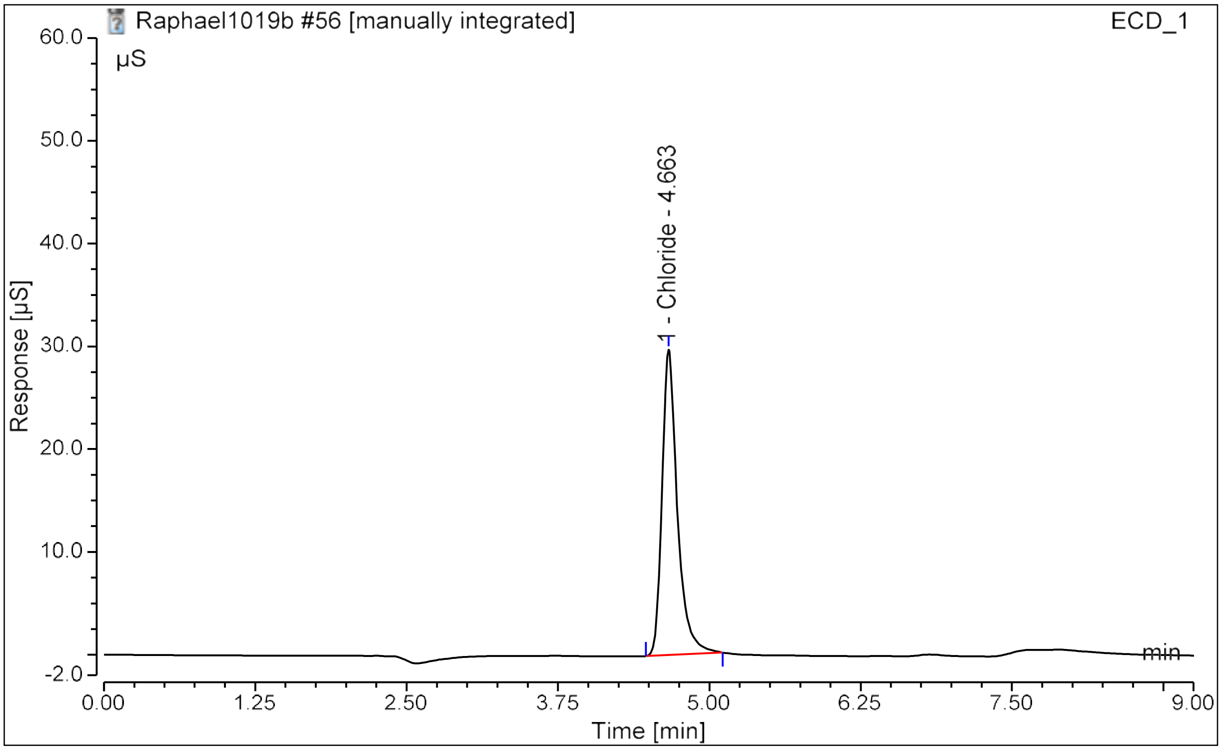


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.22	Fluoride	0.018	0.054	0.04510	FALSE	FALSE
2	4.66	Chloride	4.326	29.542	23.94912	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.Acute-R2.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 01:44**	Run Time:	**14.50**

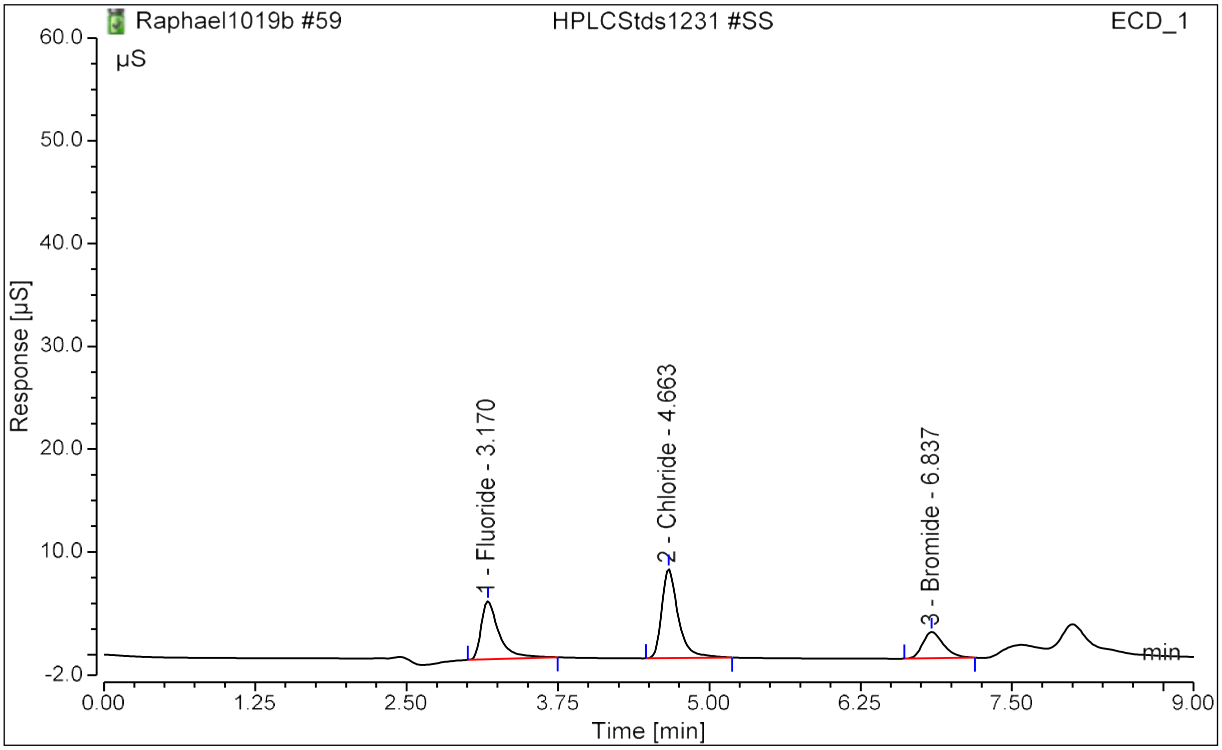


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.66	Chloride	4.350	29.716	24.06019	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 02:33**	Run Time:	**14.50**

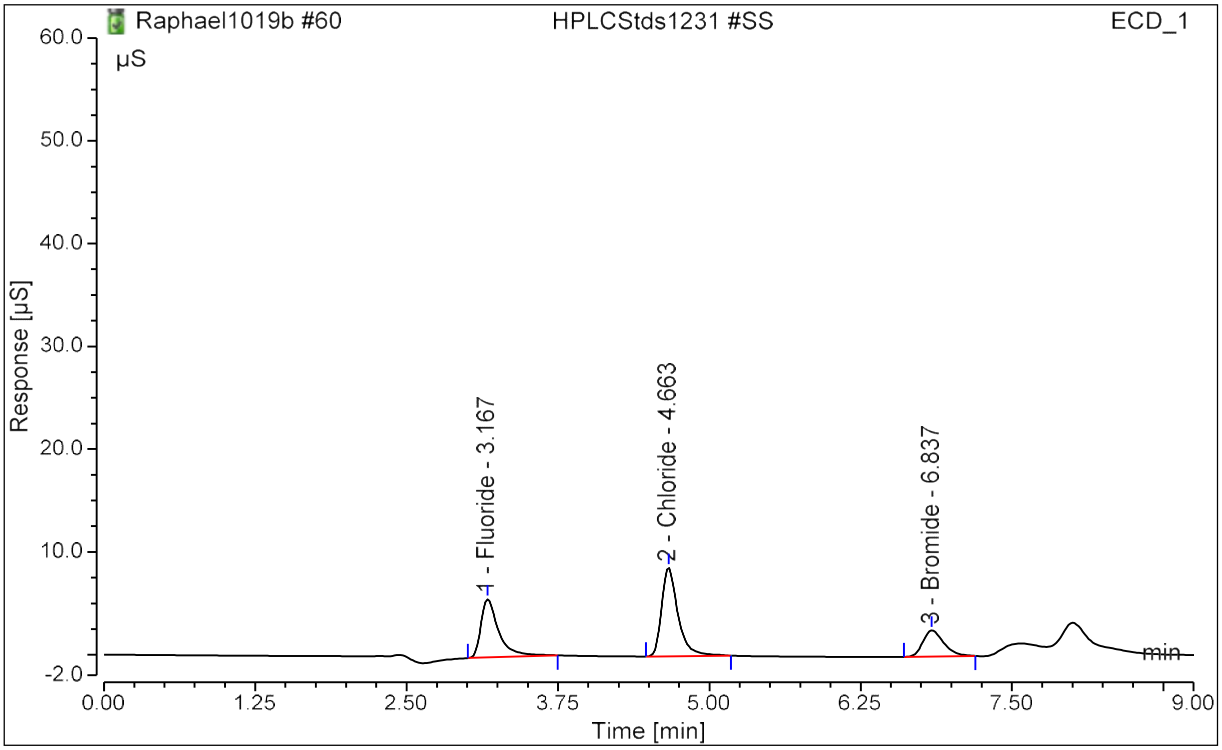


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.970	5.652	4.02216	FALSE	FALSE
2	4.66	Chloride	1.364	8.673	8.30953	FALSE	FALSE
3	6.84	Bromide	0.511	2.559	8.34801	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 02:49**	Run Time:	**14.50**

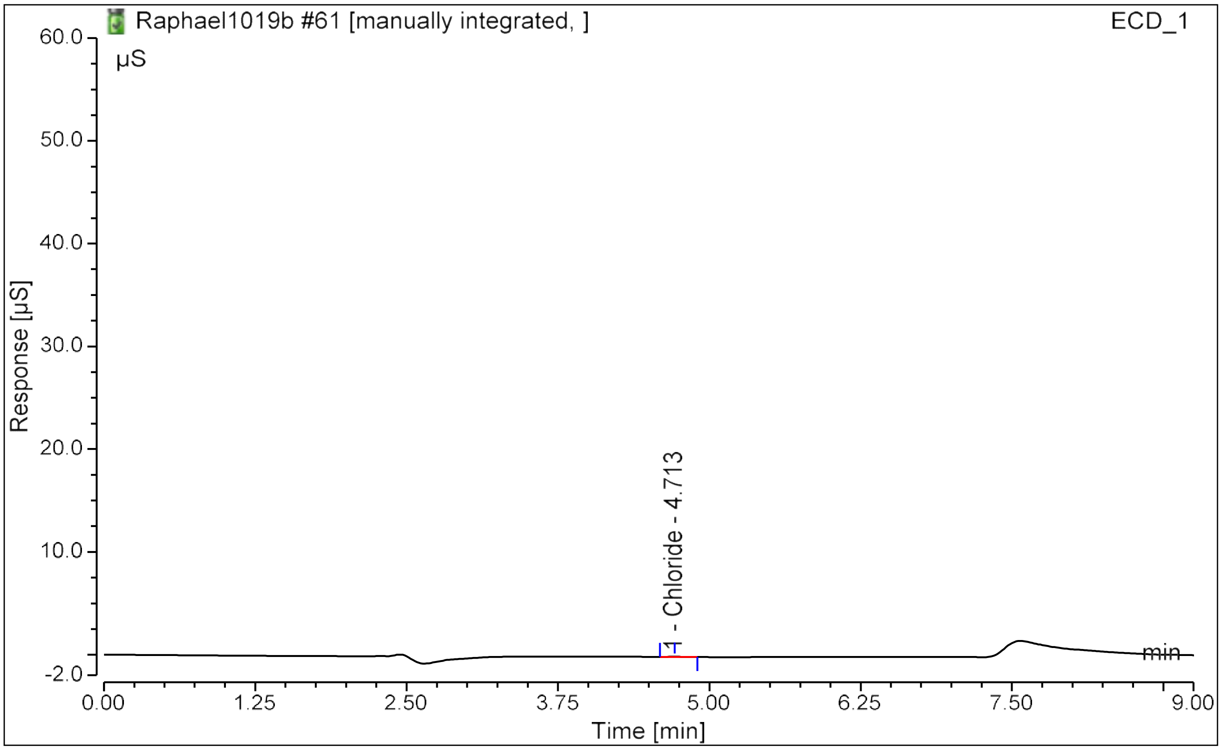


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.968	5.677	4.01341	FALSE	FALSE
2	4.66	Chloride	1.355	8.636	8.25734	FALSE	FALSE
3	6.84	Bromide	0.511	2.550	8.34622	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 03:05**	Run Time:	**14.50**

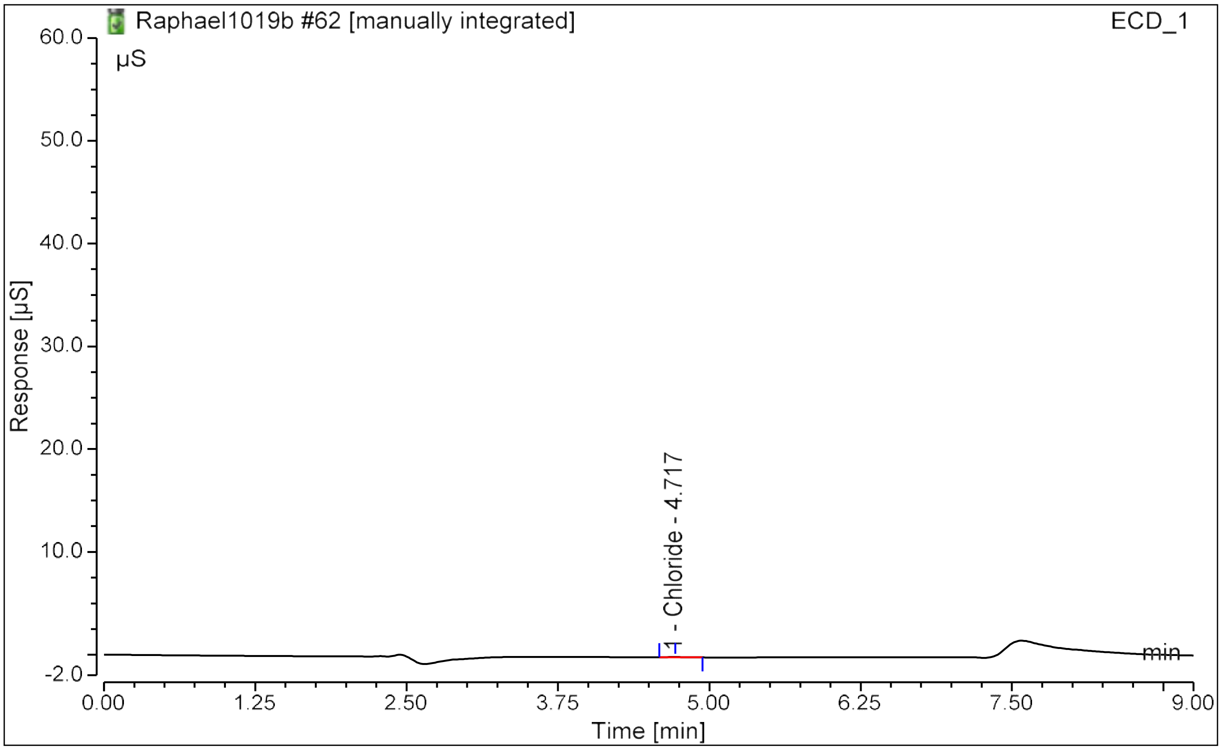


Analyst Comment: NI PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.71	Chloride	0.003	0.018	0.06498	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 03:21**	Run Time:	**14.50**

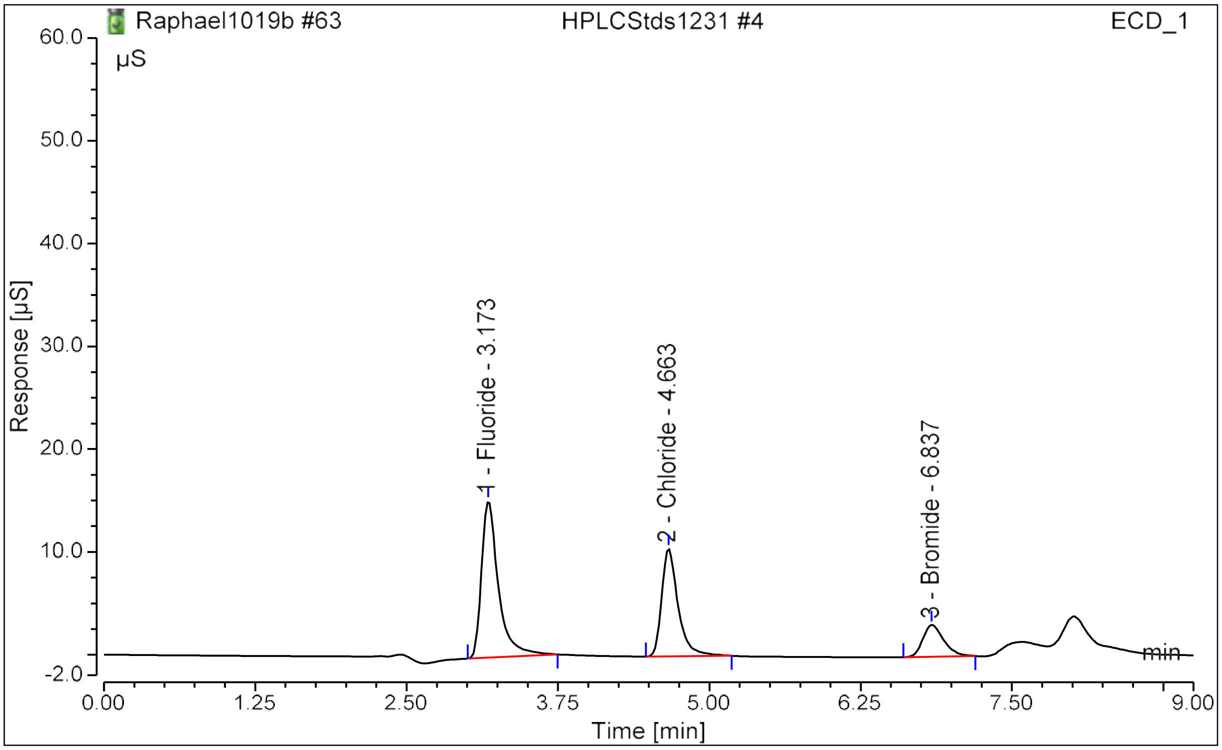


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.72	Chloride	0.003	0.019	0.06659	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 03:38**	Run Time:	**14.50**

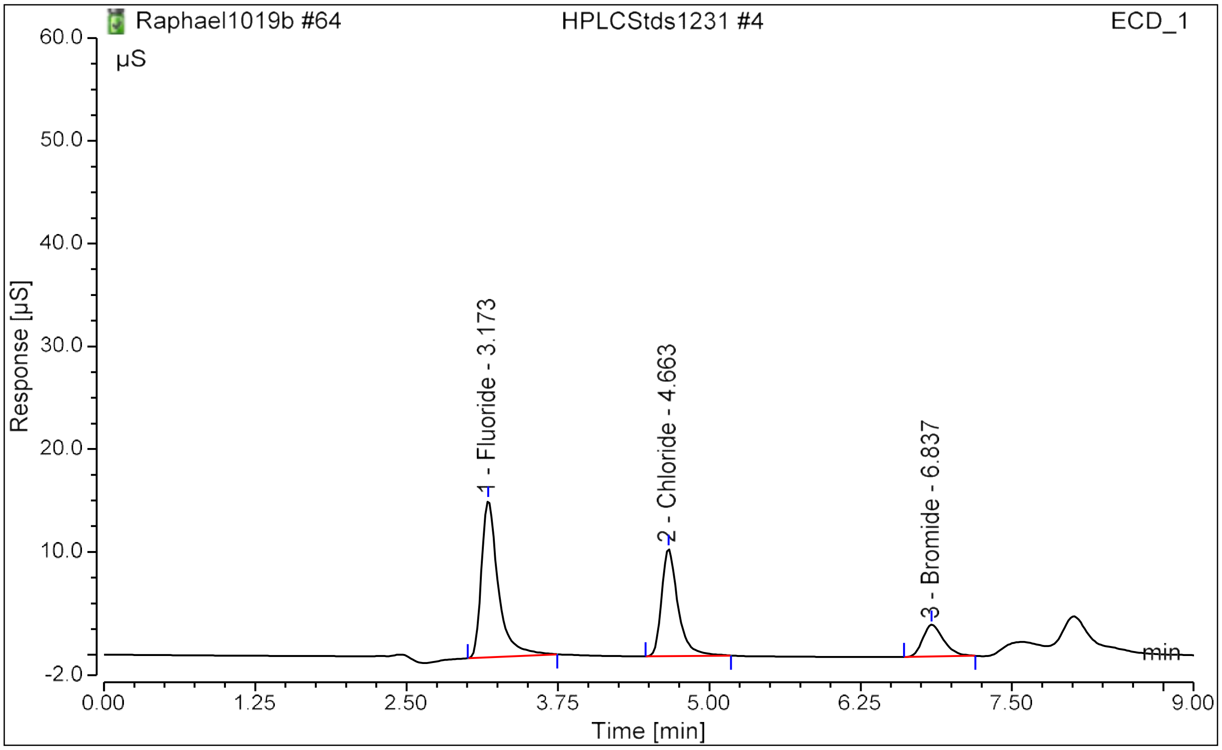


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	2.465	15.250	10.04474	FALSE	FALSE
2	4.66	Chloride	1.651	10.491	9.96229	FALSE	FALSE
3	6.84	Bromide	0.621	3.098	10.07620	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 03:54**	Run Time:	**14.50**

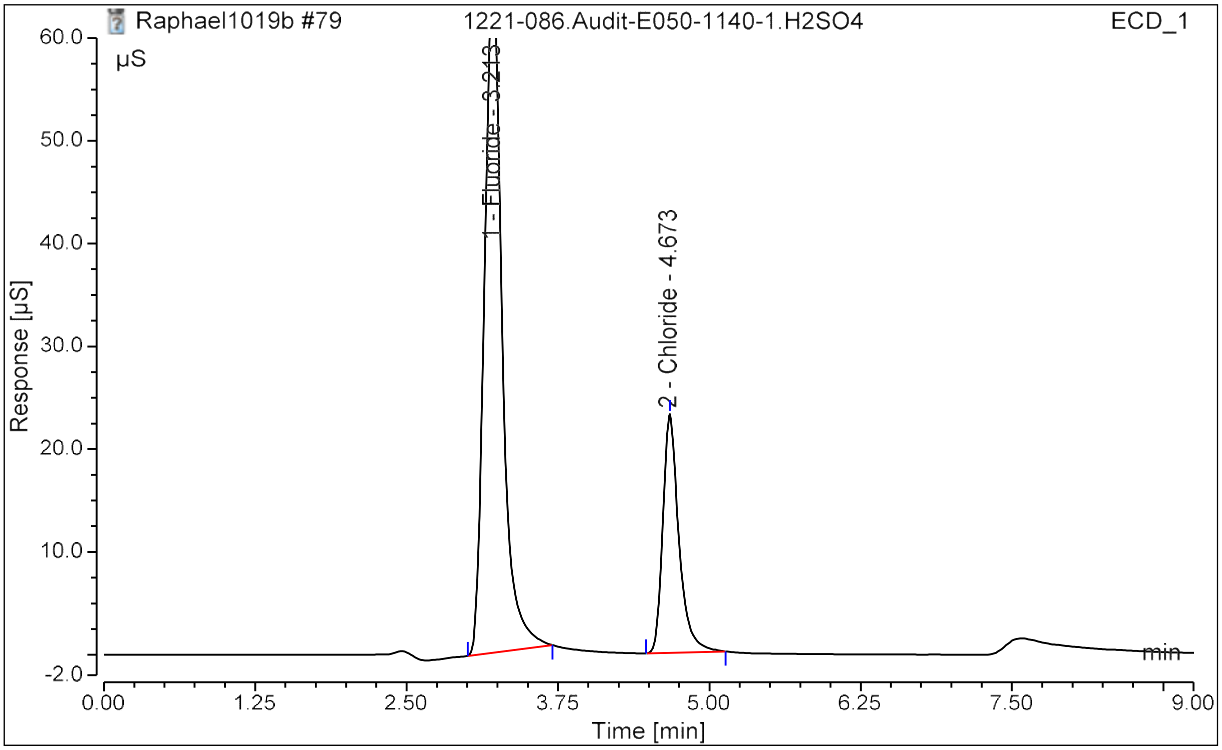


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	2.458	15.244	10.01885	FALSE	FALSE
2	4.66	Chloride	1.643	10.445	9.91939	FALSE	FALSE
3	6.84	Bromide	0.618	3.085	10.02904	FALSE	FALSE

Peak Analysis Report

Sample Name:	**1221-086.Audit-E050-1140-1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 07:56**	Run Time:	**14.50**

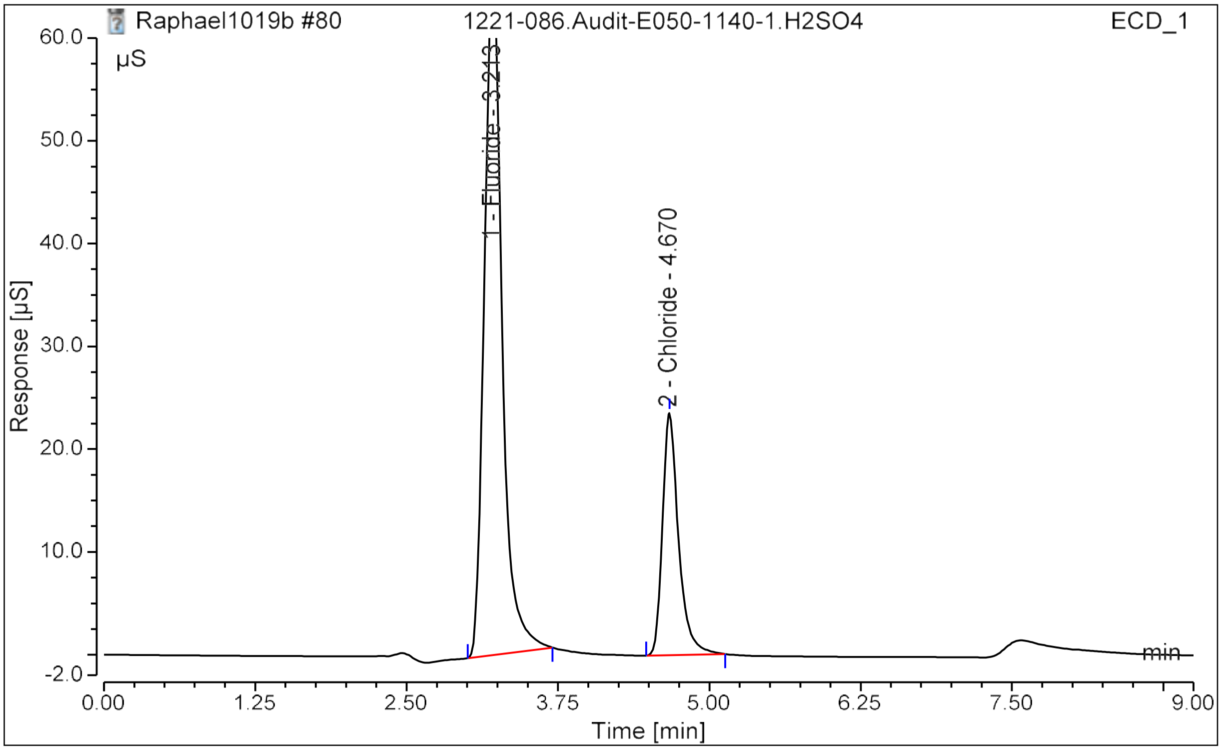


Analyst Comment: F over curve

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.21	Fluoride	11.136	66.387	39.58985	FALSE	FALSE
2	4.67	Chloride	3.560	23.202	20.20646	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.Audit-E050-1140-1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 08:13**	Run Time:	**14.50**

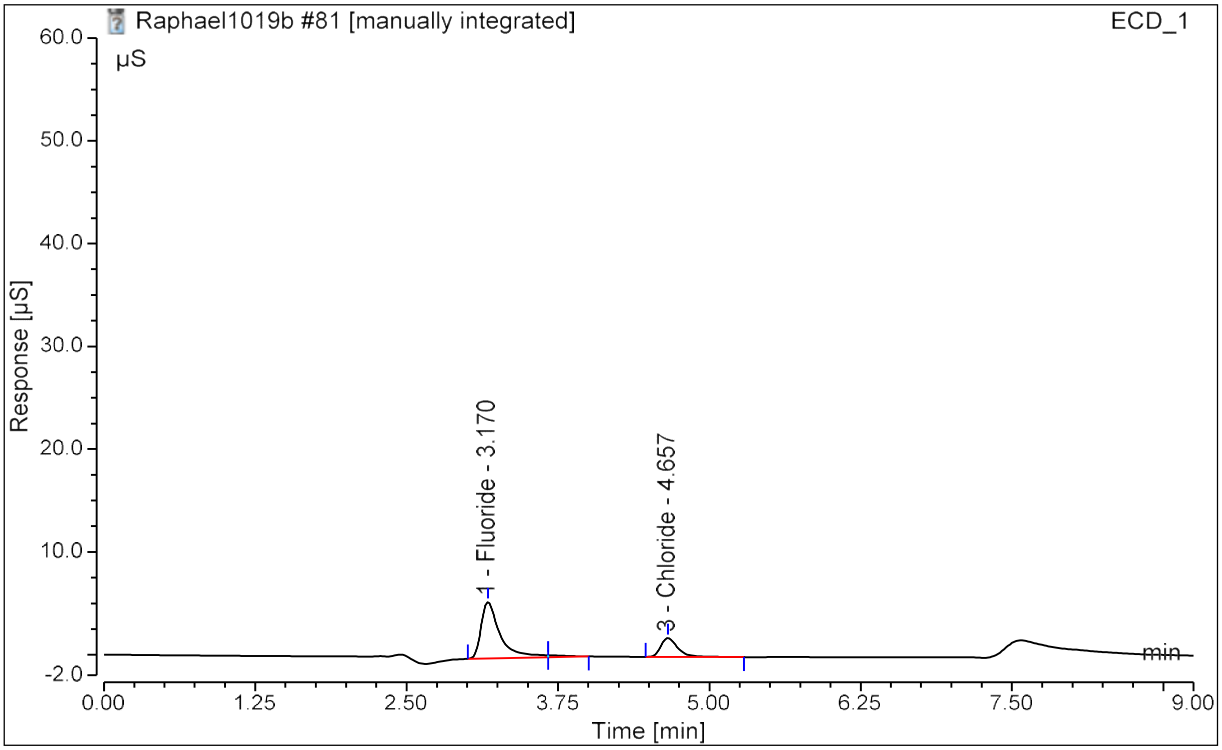


Analyst Comment: F over curve

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.21	Fluoride	11.271	67.316	39.97751	FALSE	FALSE
2	4.67	Chloride	3.620	23.601	20.50868	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.Audit-E050-1140-1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**10.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 08:29**	Run Time:	**14.50**

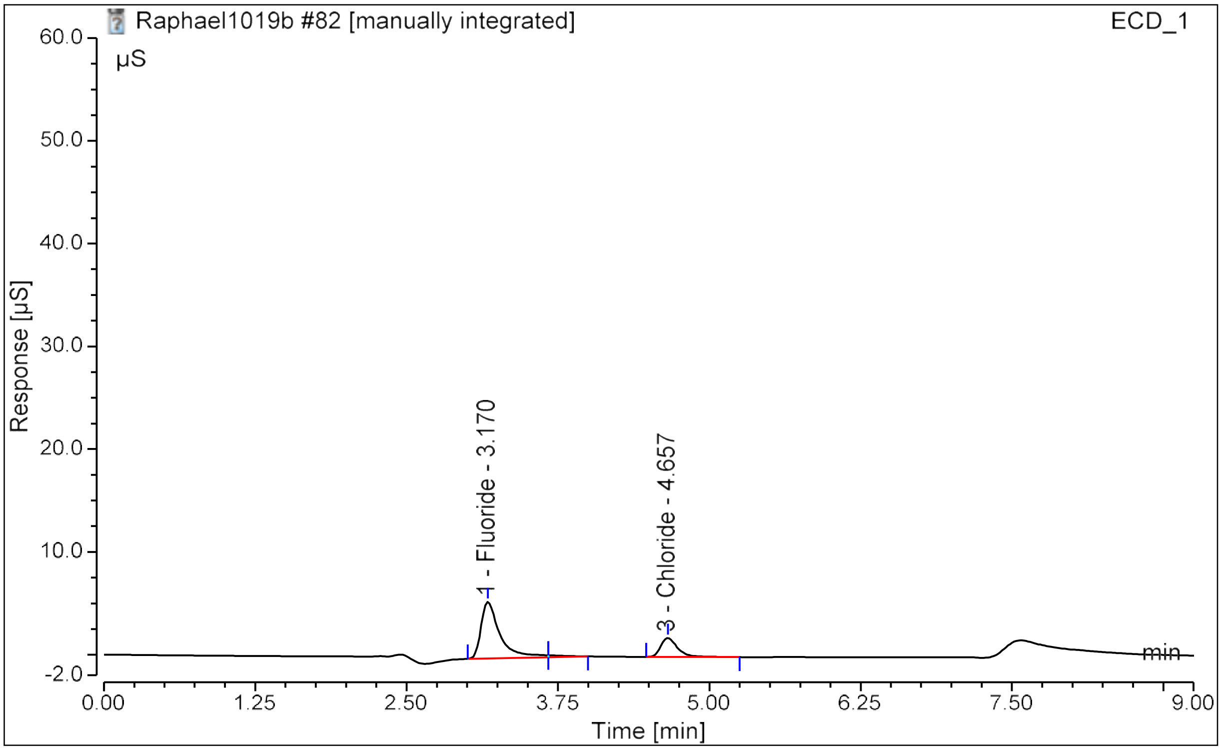


Analyst Comment: Report F, Il PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.991	5.482	4.10972	FALSE	TRUE
3	4.66	Chloride	0.300	1.856	1.92418	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.Audit-E050-1140-1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**10.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 08:45**	Run Time:	**14.50**

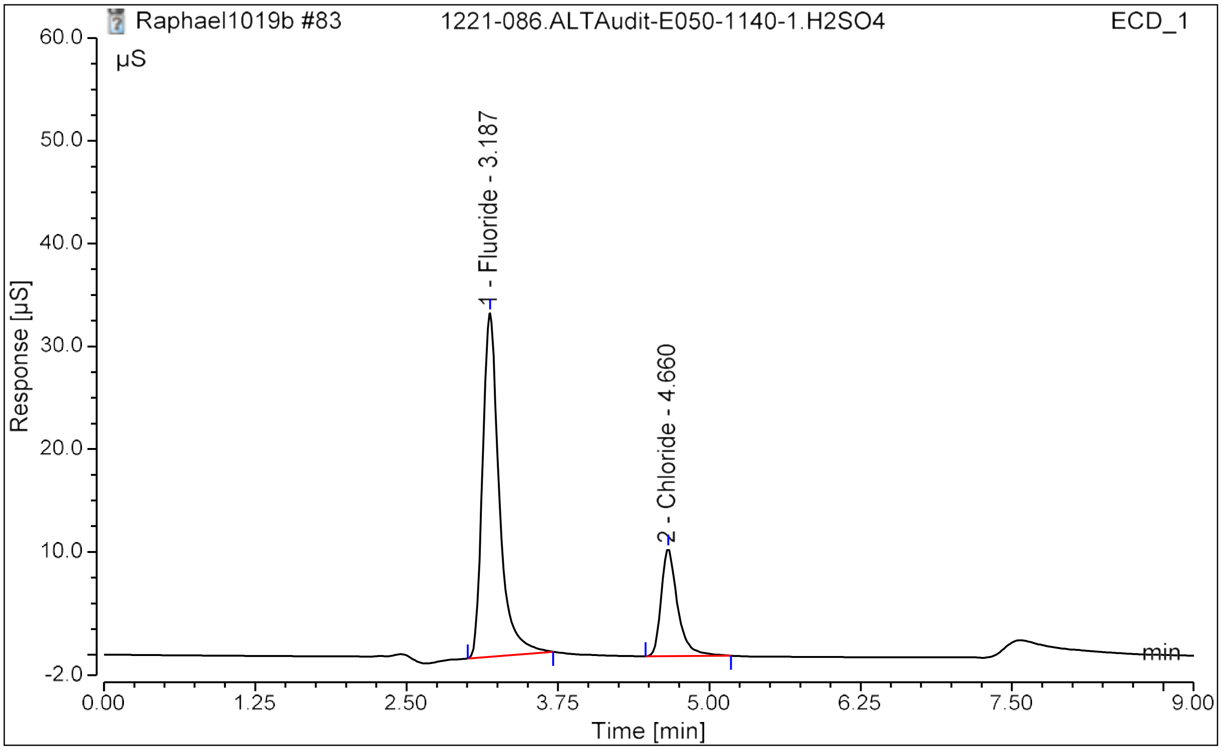


Analyst Comment: Report F, II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.986	5.486	4.09061	FALSE	TRUE
3	4.66	Chloride	0.299	1.856	1.91419	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.ALTAudit-E050-1140-1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 09:01**	Run Time:	**14.50**

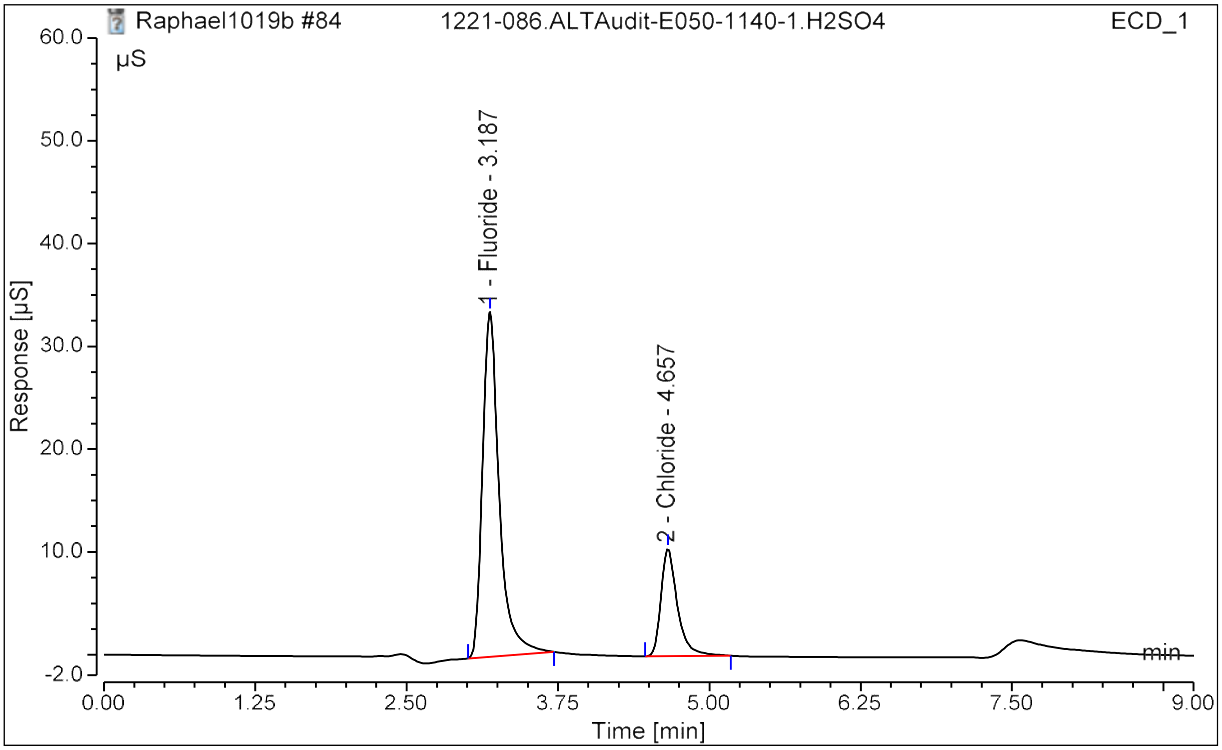


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.19	Fluoride	5.357	33.438	20.91946	FALSE	FALSE
2	4.66	Chloride	1.645	10.432	9.93304	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**1221-086.ALTAudit-E050-1140-1.H2SO4**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 09:17**	Run Time:	**14.50**

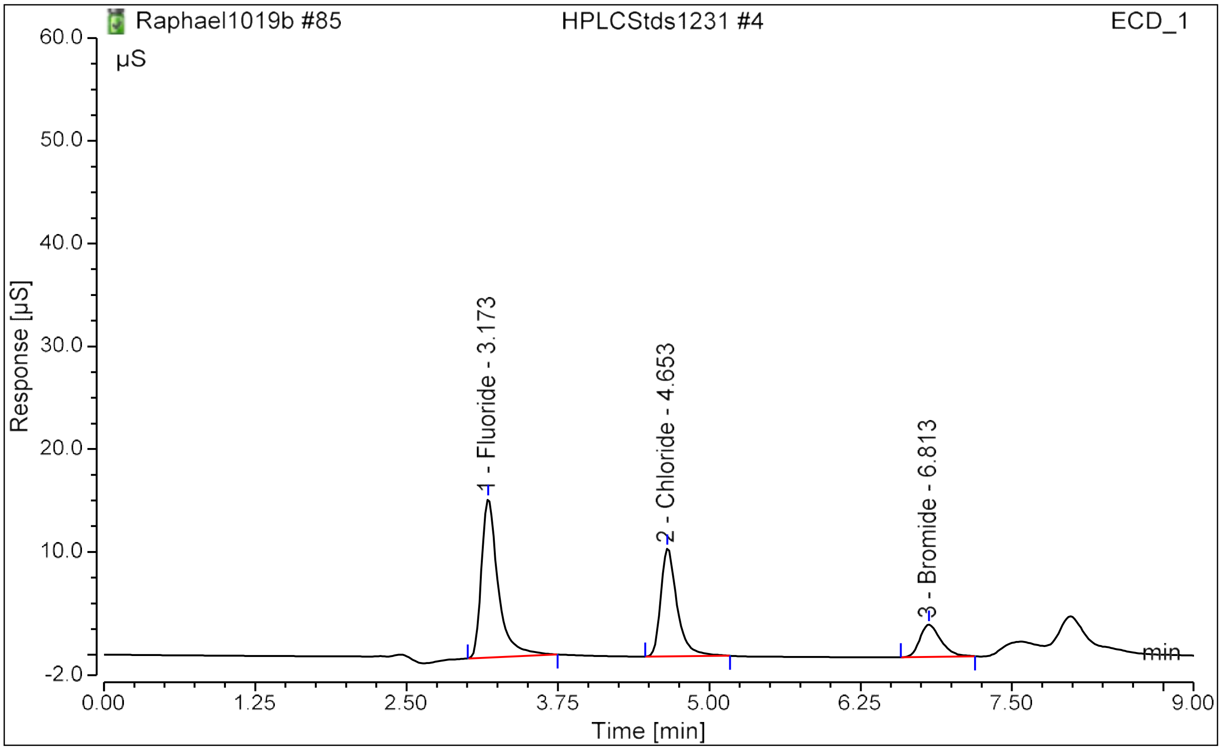


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.19	Fluoride	5.373	33.555	20.97598	FALSE	FALSE
2	4.66	Chloride	1.649	10.465	9.95311	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 09:33**	Run Time:	**14.50**

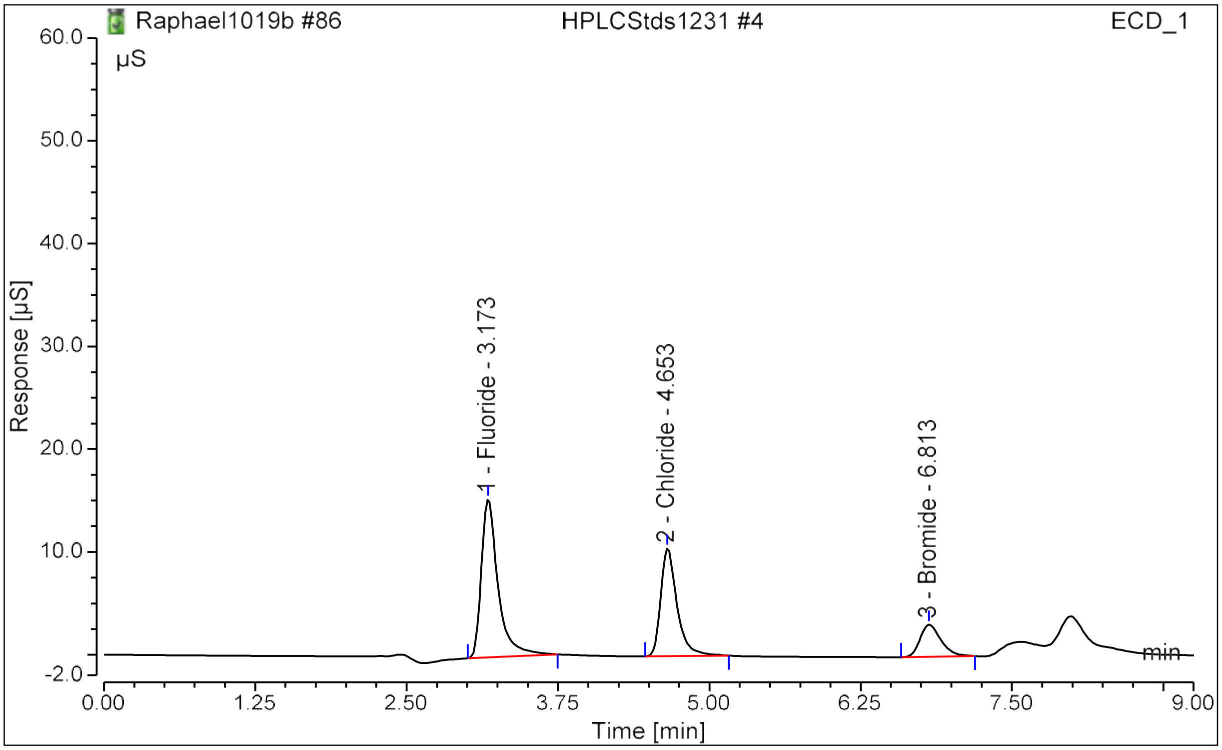


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	2.473	15.431	10.07760	FALSE	FALSE
2	4.65	Chloride	1.651	10.519	9.96202	FALSE	FALSE
3	6.81	Bromide	0.629	3.130	10.20057	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 09:50**	Run Time:	**14.50**

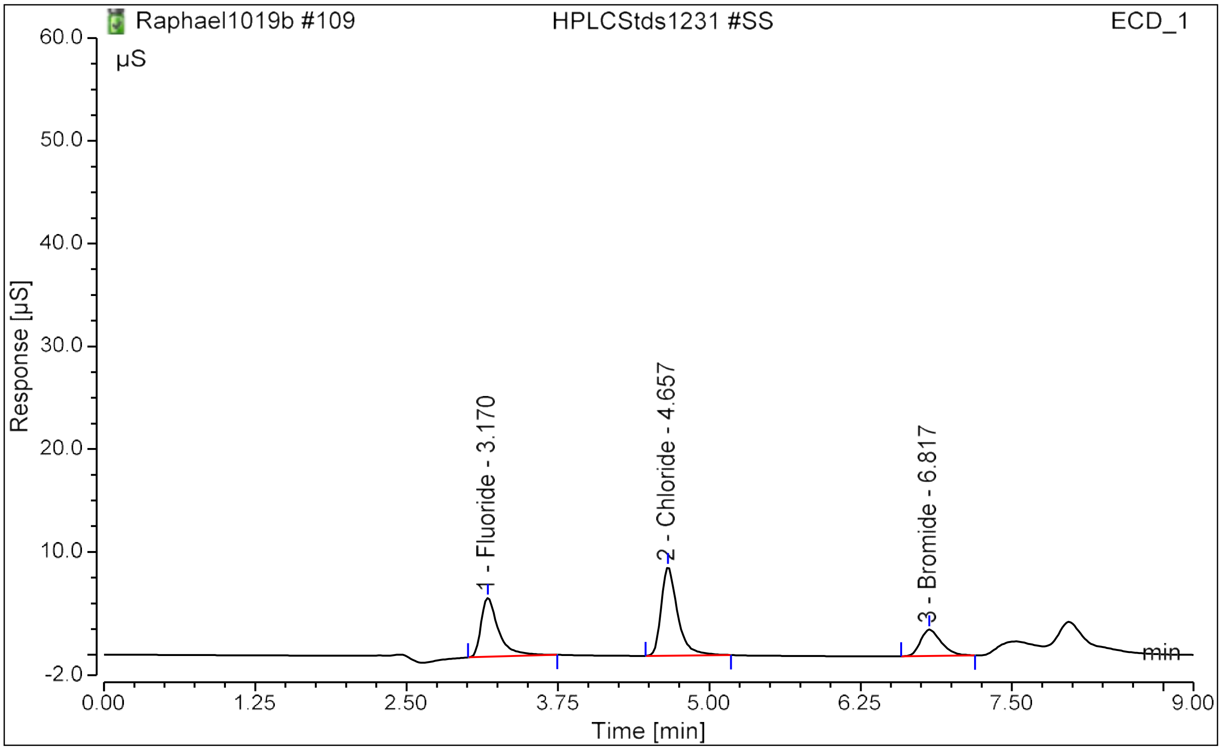


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	2.461	15.384	10.03009	FALSE	FALSE
2	4.65	Chloride	1.642	10.492	9.91329	FALSE	FALSE
3	6.81	Bromide	0.625	3.120	10.13732	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 16:17**	Run Time:	**14.50**

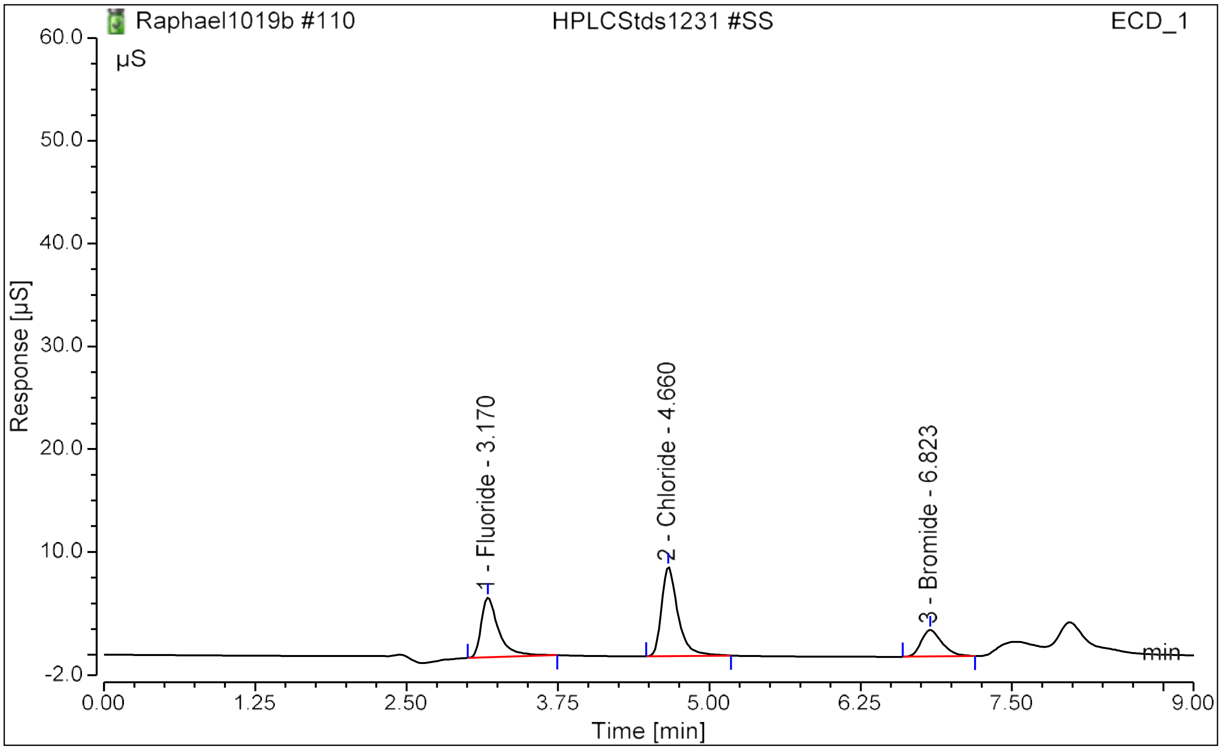


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.964	5.739	3.99814	FALSE	FALSE
2	4.66	Chloride	1.357	8.621	8.27073	FALSE	FALSE
3	6.82	Bromide	0.514	2.562	8.40190	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 16:33**	Run Time:	**14.50**

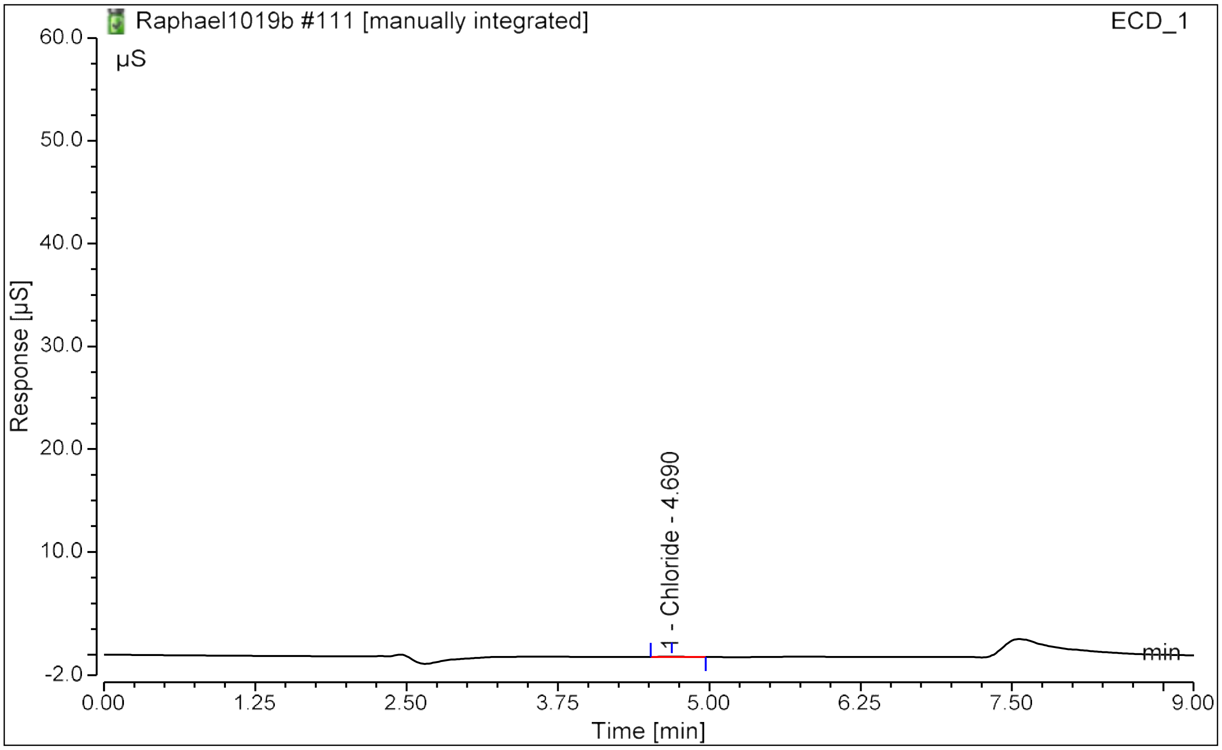


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.978	5.814	4.05589	FALSE	FALSE
2	4.66	Chloride	1.368	8.690	8.33706	FALSE	FALSE
3	6.82	Bromide	0.519	2.578	8.47545	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 16:49**	Run Time:	**14.50**

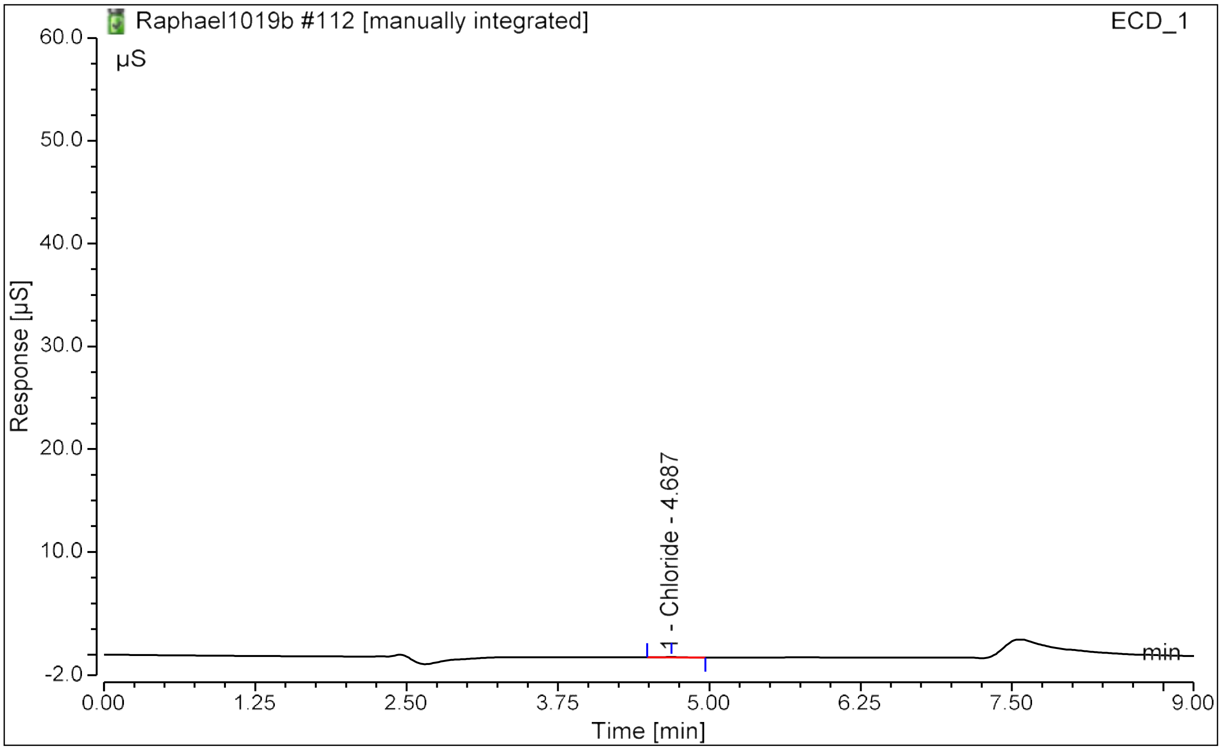


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.69	Chloride	0.007	0.037	0.09233	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 17:05**	Run Time:	**14.50**

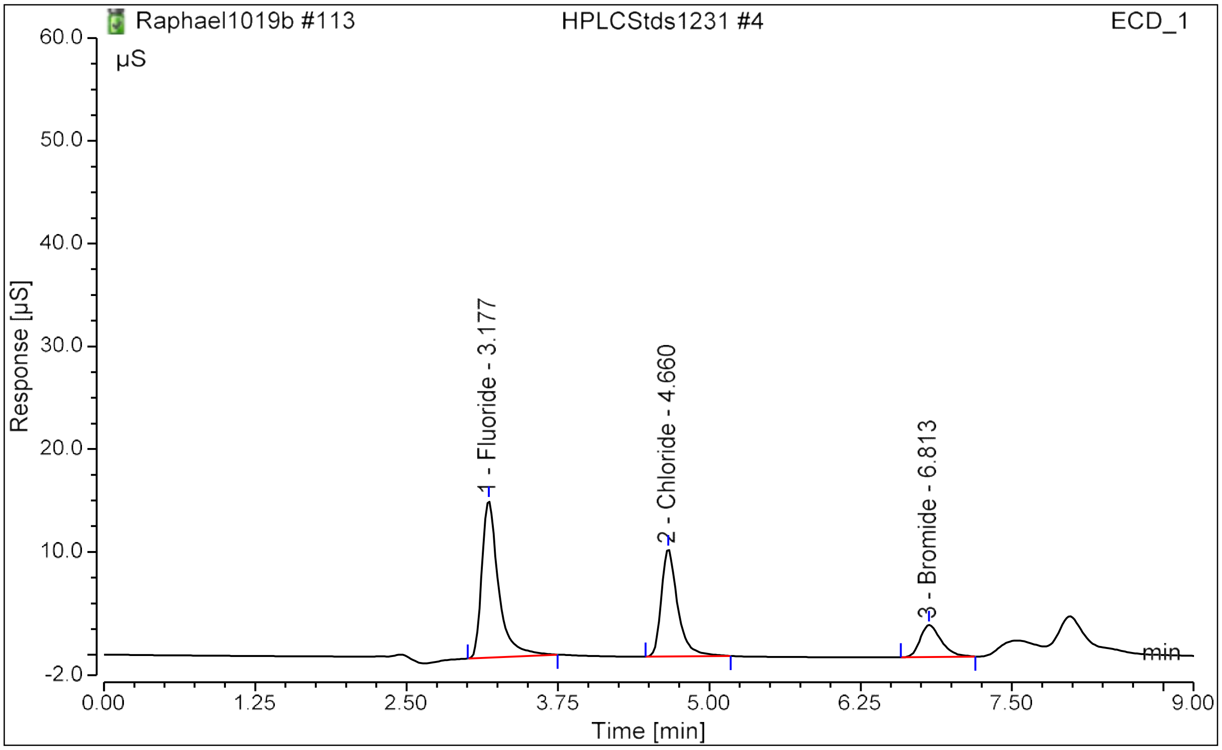


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.69	Chloride	0.007	0.036	0.09119	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 17:21**	Run Time:	**14.50**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	2.448	15.290	9.97912	FALSE	FALSE
2	4.66	Chloride	1.643	10.442	9.91870	FALSE	FALSE
3	6.81	Bromide	0.631	3.121	10.23420	FALSE	FALSE

Calibration Table

No.	Injection Name	Inject Time	Pos.	Level	Ref.Amount	Calibration Point Status	Amount	Cal Point Status	Amount	Cal Point Status	Dil.Factor	Volume
					µg/mL ECD_1 Chloride	ECD_1 Chloride	µg/mL ECD_1 Fluoride	ECD_1 Fluoride	µg/mL ECD_1 Bromide	ECD_1 Bromide		
1	HPLCStds1231 #6	14/Dec/2021 14:04	GA6	06	30.5560	Ok	30.5560	Ok	30.5560	Ok	1.0000	25.00
2	HPLCStds1231 #6	14/Dec/2021 14:20	GA6	06	30.5560	Ok	30.5560	Ok	30.5560	Ok	1.0000	25.00
3	HPLCStds1231 #5	14/Dec/2021 14:36	GA5	05	15.1104	Ok	15.1104	Ok	15.1104	Ok	1.0000	25.00
4	HPLCStds1231 #5	14/Dec/2021 14:52	GA5	05	15.1104	Ok	15.1104	Ok	15.1104	Ok	1.0000	25.00
5	HPLCStds1231 #4	14/Dec/2021 15:08	GA4	04	9.9099	Ok	9.9099	Ok	9.9099	Ok	1.0000	25.00
6	HPLCStds1231 #4	14/Dec/2021 15:25	GA4	04	9.9099	Ok	9.9099	Ok	9.9099	Ok	1.0000	25.00
7	HPLCStds1231 #3	14/Dec/2021 15:41	GA3	03	4.9430	Ok	4.9430	Ok	4.9430	Ok	1.0000	25.00
8	HPLCStds1231 #3	14/Dec/2021 15:57	GA3	03	4.9430	Ok	4.9430	Ok	4.9430	Ok	1.0000	25.00
11	Raphael1019 #1	15/Dec/2021 11:37	GA1	01	0.4990	Ok	0.4990	Ok	0.4990	Ok	1.0000	25.00
12	Raphael1019 #1	15/Dec/2021 11:54	GA1	01	0.4990	Ok	0.4990	Ok	0.4990	Ok	1.0000	25.00
87	HPLCStds1231 #2	16/Dec/2021 10:20	GA2	02	1.0097	Ok	1.0097	Ok	1.0097	Ok	1.0000	25.00
88	HPLCStds1231 #2	16/Dec/2021 10:36	GA2	02	1.0097	Ok	1.0097	Ok	1.0097	Ok	1.0000	25.00
133	HPLCStds1231 #6	16/Dec/2021 22:45	GA6	06	30.5560	Ok	30.5560	Ok	30.5560	Ok	1.0000	25.00
134	HPLCStds1231 #6	16/Dec/2021 23:01	GA6	06	30.5560	Ok	30.5560	Ok	30.5560	Ok	1.0000	25.00
135	HPLCStds1231 #5	16/Dec/2021 23:17	GA5	05	15.1104	Ok	15.1104	Ok	15.1104	Ok	1.0000	25.00
136	HPLCStds1231 #5	16/Dec/2021 23:34	GA5	05	15.1104	Ok	15.1104	Ok	15.1104	Ok	1.0000	25.00
137	HPLCStds1231 #4	16/Dec/2021 23:50	GA4	04	9.9099	Ok	9.9099	Ok	9.9099	Ok	1.0000	25.00
138	HPLCStds1231 #4	17/Dec/2021 00:06	GA4	04	9.9099	Ok	9.9099	Ok	9.9099	Ok	1.0000	25.00
139	HPLCStds1231 #3	17/Dec/2021 00:22	GA3	03	4.9430	Ok	4.9430	Ok	4.9430	Ok	1.0000	25.00
140	HPLCStds1231 #3	17/Dec/2021 00:38	GA3	03	4.9430	Ok	4.9430	Ok	4.9430	Ok	1.0000	25.00
141	HPLCStds1231 #2	17/Dec/2021 00:55	GA2	02	1.0097	Ok	1.0097	Ok	1.0097	Ok	1.0000	25.00
143	Raphael1019 #1	17/Dec/2021 01:27	GA1	01	0.4990	Ok	0.4990	Ok	0.4990	Ok	1.0000	25.00
144	Raphael1019 #1	17/Dec/2021 01:43	GA1	01	0.4990	Ok	0.4990	Ok	0.4990	Ok	1.0000	25.00

Detection Parameters

Ret. Time min	Param. Name	Param. Value	Inj. Type	Channel
Always	Baseline Noise Auto Range	Off	Any	All Channels
Always	Baseline Noise Start Time	0.520 [min]	Any	All Channels
Always	Baseline Noise End Time	1.976 [min]	Any	All Channels
Always	Cobra Smoothing Width	Auto	Any	All Channels
Always	Consider Void Peak	Off	Any	All Channels
0.000	Maximum Rider Ratio	10 [%]	Any	All Channels
0.000	Fronting Sensitivity Factor	0.250 [%]	Any	All Channels
0.000	Detect Shoulder Peaks	Off	Any	All Channels
0.000	Baseline Point	Fixed	Any	All Channels
0.000	Tailing Sensitivity Factor	0.750 [%]	Any	All Channels
0.000	Minimum Area	0.0010 [Signal*min]	Any	All Channels
0.000	Inhibit Integration	On	Any	All Channels
3.000	Inhibit Integration	Off	Any	All Channels
3.750	Inhibit Integration	On	Any	All Channels
4.400	Inhibit Integration	Off	Any	All Channels
5.500	Inhibit Integration	On	Any	All Channels
6.500	Inhibit Integration	Off	Any	All Channels
7.200	Inhibit Integration	On	Any	All Channels

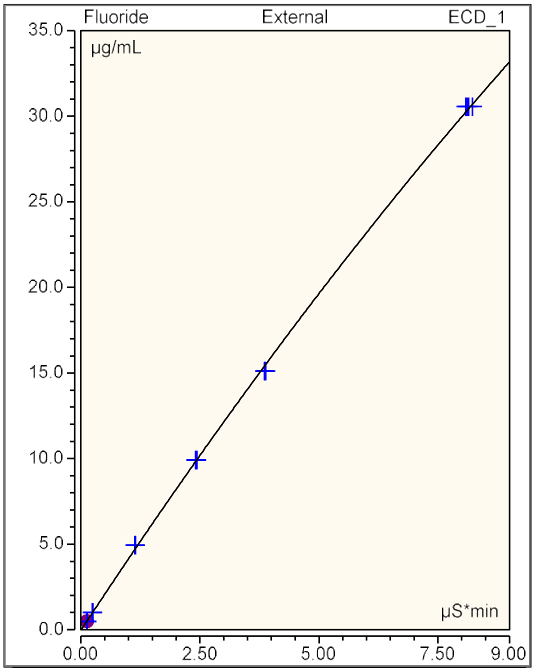
Calibration Batch Report

Sequence:	**Raphael1019b**	*Injection Volume:*	**25.00**
Instrument Method:	**AS22 ASAP**	*Operator:*	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 11:37**	*Run Time:*	**14.5**

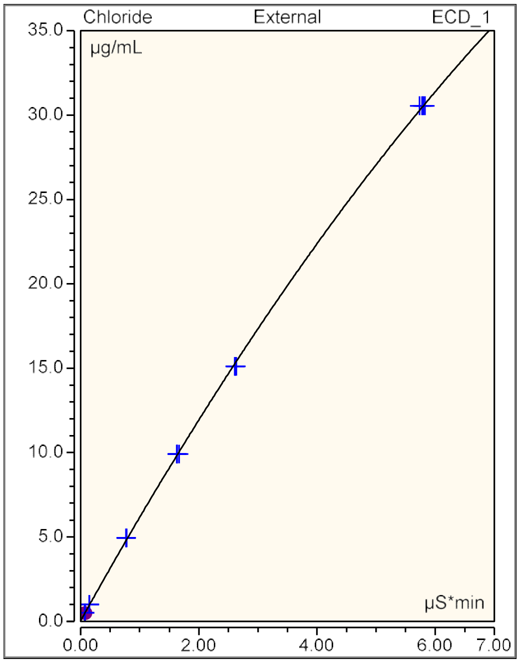
Calibration Summary

Peak Name	Eval.Type	Cal.Type	Points	Offset (C0)	Slope (C1)	Curve (C2)	Coeff.Det. %
Fluoride	Area	Quad, WithOffset, 1/A	23.000	-0.030	4.238	-0.061	99.959
Chloride	Area	Quad, WithOffset, 1/A	23.000	0.048	6.304	-0.180	99.980
Bromide	Area	Quad, WithOffset, 1/A	23.000	0.008	16.792	-0.922	99.982
			AVERAGE:	0.0087	9.1111	-0.3878	99.9737

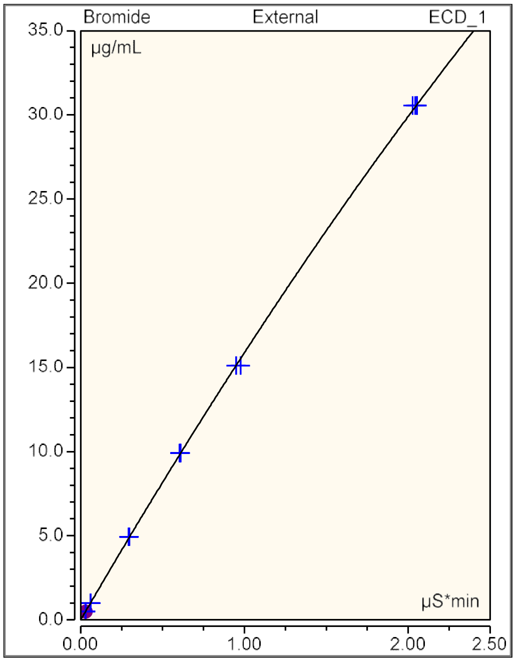
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Fluoride	Fluoride	Fluoride	Fluoride
HPLCStds1231 #6	3.197	8.145	50.417	30.435
HPLCStds1231 #6	3.197	8.228	50.902	30.704
HPLCStds1231 #5	3.180	3.886	23.759	15.516
HPLCStds1231 #5	3.180	3.862	23.769	15.427
HPLCStds1231 #4	3.173	2.438	14.649	9.940
HPLCStds1231 #4	3.173	2.431	14.664	9.910
HPLCStds1231 #3	3.170	1.137	6.522	4.707
HPLCStds1231 #3	3.170	1.144	6.574	4.736
Raphael1019 #1	3.177	0.127	0.605	0.508
Raphael1019 #1	3.177	0.132	0.614	0.527
HPLCStds1231 #2	3.170	0.243	1.219	0.997
HPLCStds1231 #2	3.173	0.248	1.231	1.017
HPLCStds1231 #6	3.203	8.087	49.475	30.248
HPLCStds1231 #6	3.200	8.115	50.378	30.337
HPLCStds1231 #5	3.183	3.873	23.705	15.466
HPLCStds1231 #5	3.183	3.857	23.837	15.406
HPLCStds1231 #4	3.180	2.414	14.668	9.845
HPLCStds1231 #4	3.180	2.411	14.765	9.834
HPLCStds1231 #3	3.173	1.138	6.633	4.713
HPLCStds1231 #3	3.173	1.144	6.687	4.739
HPLCStds1231 #2	3.177	0.235	1.172	0.962
Raphael1019 #1	3.180	0.131	0.612	0.524
Raphael1019 #1	3.183	0.130	0.613	0.520



Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Chloride	Chloride	Chloride	Chloride
HPLCStds1231 #6	4.663	5.777	39.125	30.453
HPLCStds1231 #6	4.663	5.828	39.457	30.669
HPLCStds1231 #5	4.660	2.633	17.056	15.396
HPLCStds1231 #5	4.657	2.609	17.007	15.268
HPLCStds1231 #4	4.653	1.662	10.521	10.030
HPLCStds1231 #4	4.657	1.636	10.453	9.877
HPLCStds1231 #3	4.647	0.771	4.851	4.804
HPLCStds1231 #3	4.653	0.778	4.868	4.845
Raphael1019 #1	4.653	0.076	0.484	0.526
Raphael1019 #1	4.650	0.075	0.478	0.519
HPLCStds1231 #2	4.653	0.150	0.944	0.990
HPLCStds1231 #2	4.653	0.149	0.945	0.986
HPLCStds1231 #6	4.673	5.731	39.235	30.260
HPLCStds1231 #6	4.677	5.799	39.514	30.549
HPLCStds1231 #5	4.663	2.622	17.198	15.339
HPLCStds1231 #5	4.660	2.615	17.185	15.301
HPLCStds1231 #4	4.660	1.629	10.523	9.838
HPLCStds1231 #4	4.660	1.630	10.522	9.843
HPLCStds1231 #3	4.663	0.767	4.855	4.776
HPLCStds1231 #3	4.660	0.771	4.871	4.800
HPLCStds1231 #2	4.657	0.146	0.934	0.963
Raphael1019 #1	4.657	0.074	0.476	0.516
Raphael1019 #1	4.663	0.074	0.477	0.514

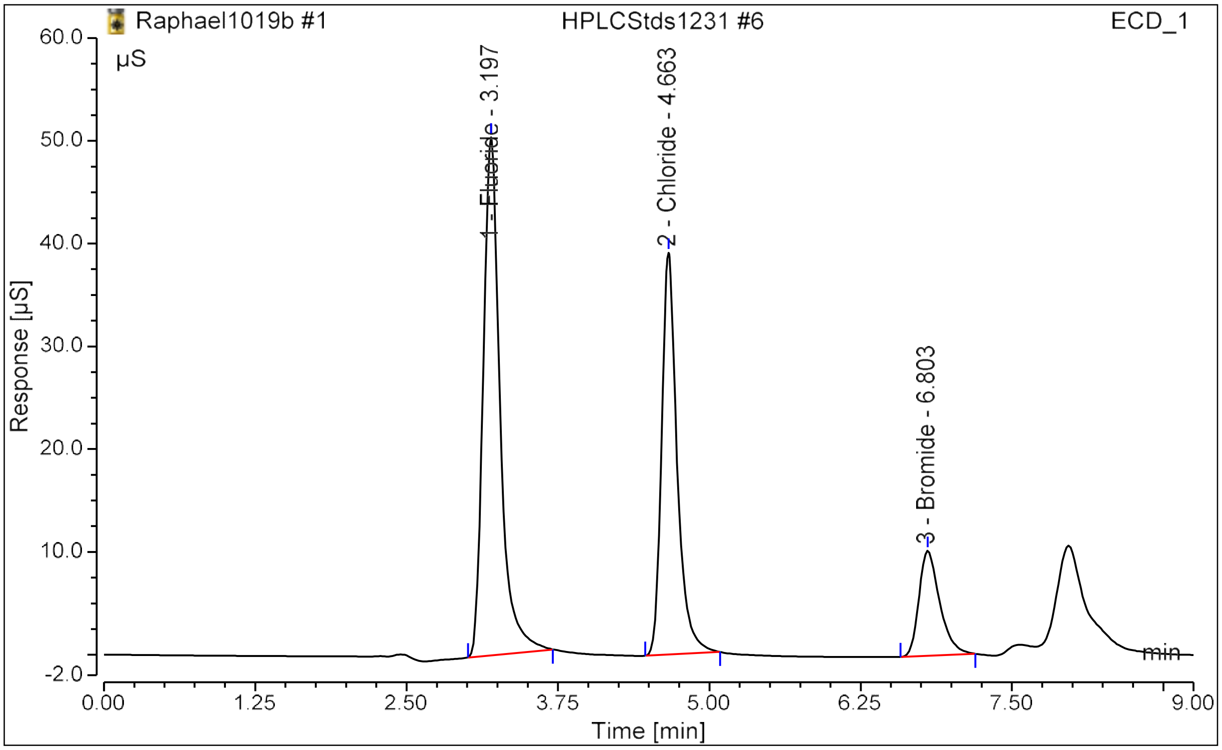


Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Bromide	Bromide	Bromide	Bromide
HPLCStds1231 #6	6.803	2.028	10.227	30.273
HPLCStds1231 #6	6.803	2.042	10.346	30.454
HPLCStds1231 #5	6.830	0.948	4.789	15.099
HPLCStds1231 #5	6.813	0.949	4.798	15.109
HPLCStds1231 #4	6.817	0.605	3.082	9.830
HPLCStds1231 #4	6.833	0.602	3.053	9.778
HPLCStds1231 #3	6.813	0.291	1.487	4.813
HPLCStds1231 #3	6.820	0.293	1.495	4.844
Raphael1019 #1	6.830	0.030	0.151	0.506
Raphael1019 #1	6.820	0.030	0.151	0.506
HPLCStds1231 #2	6.820	0.059	0.299	1.001
HPLCStds1231 #2	6.817	0.062	0.308	1.051
HPLCStds1231 #6	6.807	2.054	10.470	30.606
HPLCStds1231 #6	6.820	2.056	10.468	30.635
HPLCStds1231 #5	6.817	0.975	4.931	15.506
HPLCStds1231 #5	6.810	0.976	4.936	15.515
HPLCStds1231 #4	6.817	0.609	3.131	9.892
HPLCStds1231 #4	6.813	0.608	3.127	9.877
HPLCStds1231 #3	6.837	0.295	1.507	4.877
HPLCStds1231 #3	6.823	0.297	1.515	4.906
HPLCStds1231 #2	6.820	0.058	0.300	0.980
Raphael1019 #1	6.823	0.029	0.150	0.495
Raphael1019 #1	6.837	0.030	0.154	0.512



Peak Analysis Report

Sample Name:	**HPLCStds1231 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 14:04**	Run Time:	**14.50**

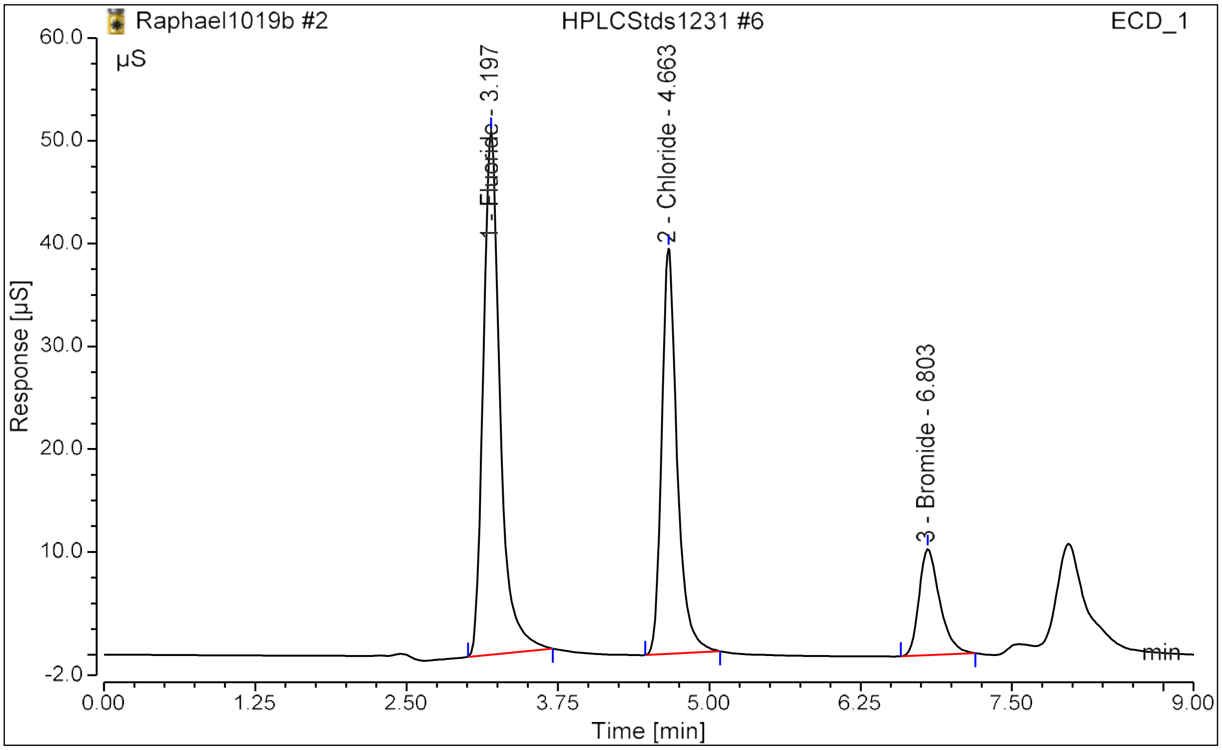


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.20	Fluoride	8.145	50.417	30.43465	FALSE	FALSE
2	4.66	Chloride	5.777	39.125	30.45314	FALSE	FALSE
3	6.80	Bromide	2.028	10.227	30.27287	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 14:20**	Run Time:	**14.50**

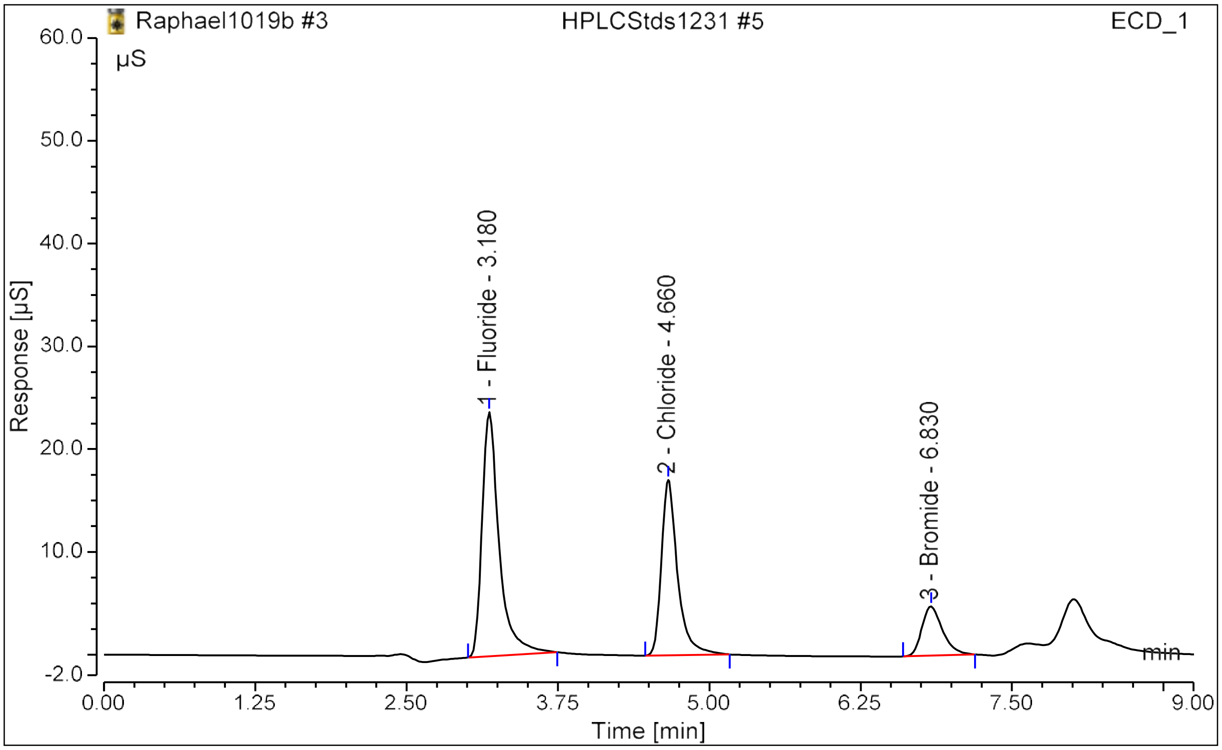


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.20	Fluoride	8.228	50.902	30.70362	FALSE	FALSE
2	4.66	Chloride	5.828	39.457	30.66886	FALSE	FALSE
3	6.80	Bromide	2.042	10.346	30.45412	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 14:36**	Run Time:	**14.50**

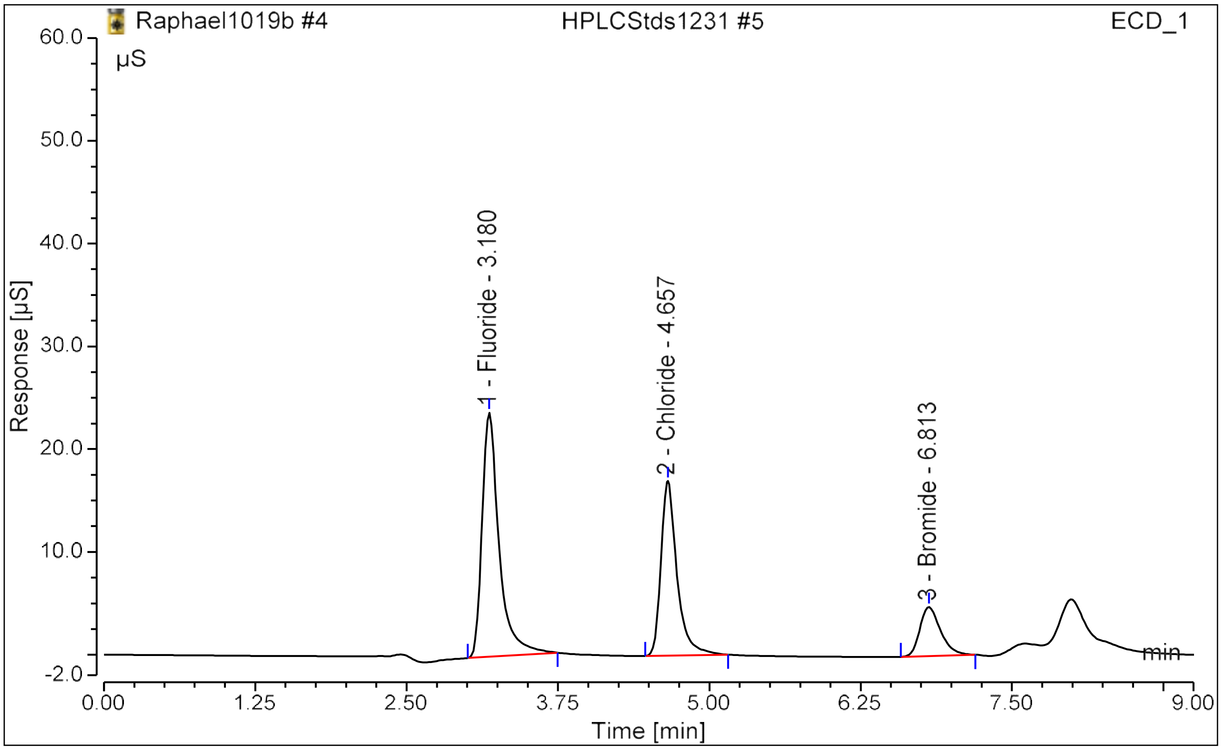


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	3.886	23.759	15.51550	FALSE	FALSE
2	4.66	Chloride	2.633	17.056	15.39565	FALSE	FALSE
3	6.83	Bromide	0.948	4.789	15.09917	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 14:52**	Run Time:	**14.50**

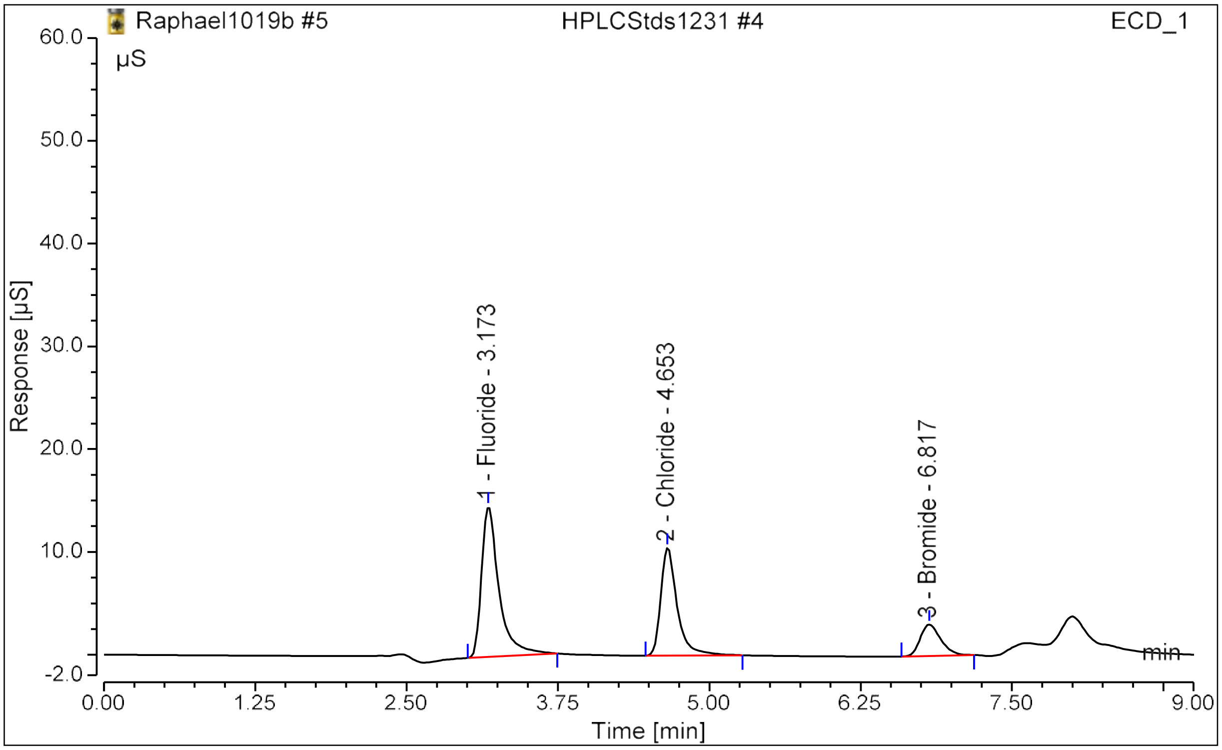


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	3.862	23.769	15.42728	FALSE	FALSE
2	4.66	Chloride	2.609	17.007	15.26817	FALSE	FALSE
3	6.81	Bromide	0.949	4.798	15.10948	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 15:08**	Run Time:	**14.50**

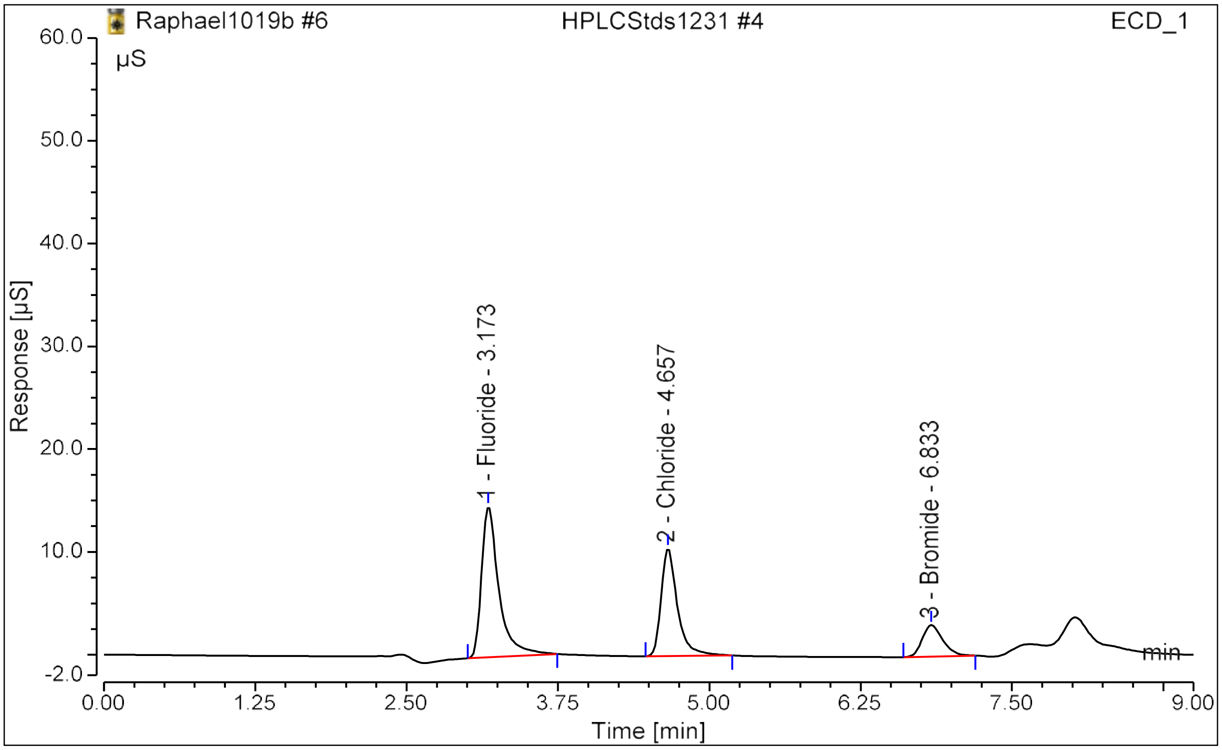


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	2.438	14.649	9.94004	FALSE	FALSE
2	4.65	Chloride	1.662	10.521	10.03041	FALSE	FALSE
3	6.82	Bromide	0.605	3.082	9.83026	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 15:25**	Run Time:	**14.50**

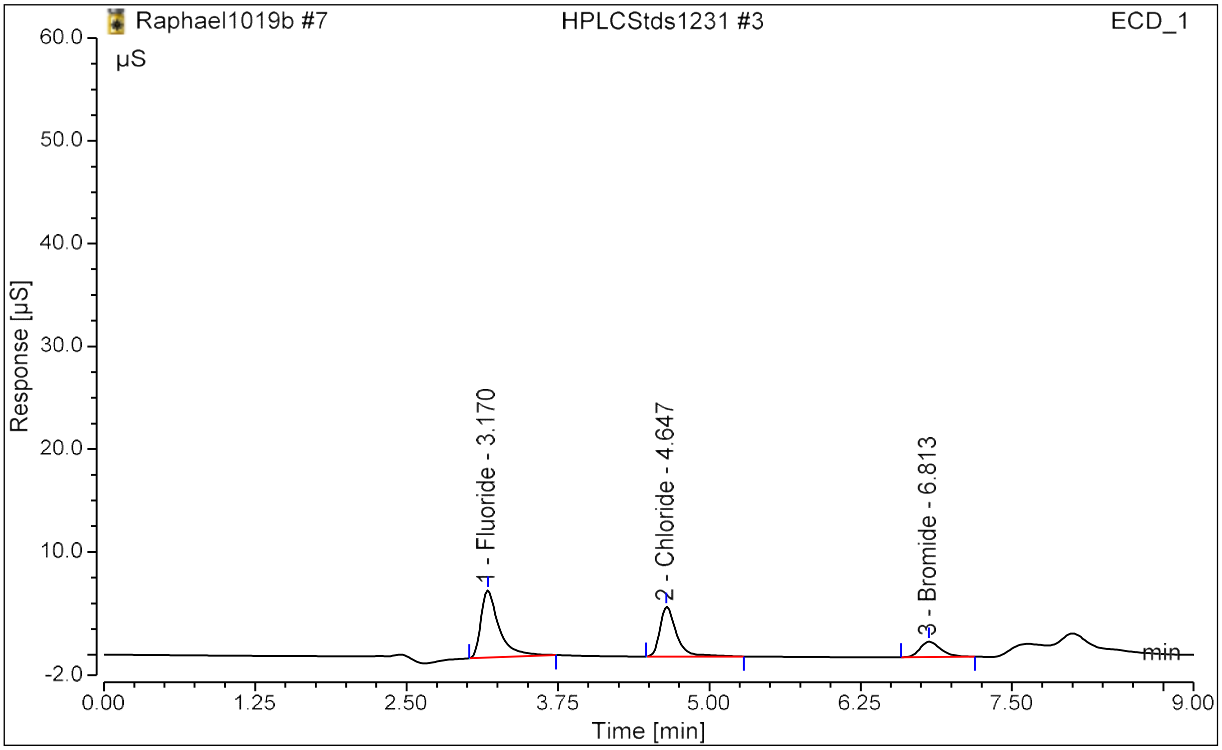


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	2.431	14.664	9.91042	FALSE	FALSE
2	4.66	Chloride	1.636	10.453	9.87695	FALSE	FALSE
3	6.83	Bromide	0.602	3.053	9.77794	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 15:41**	Run Time:	**14.50**

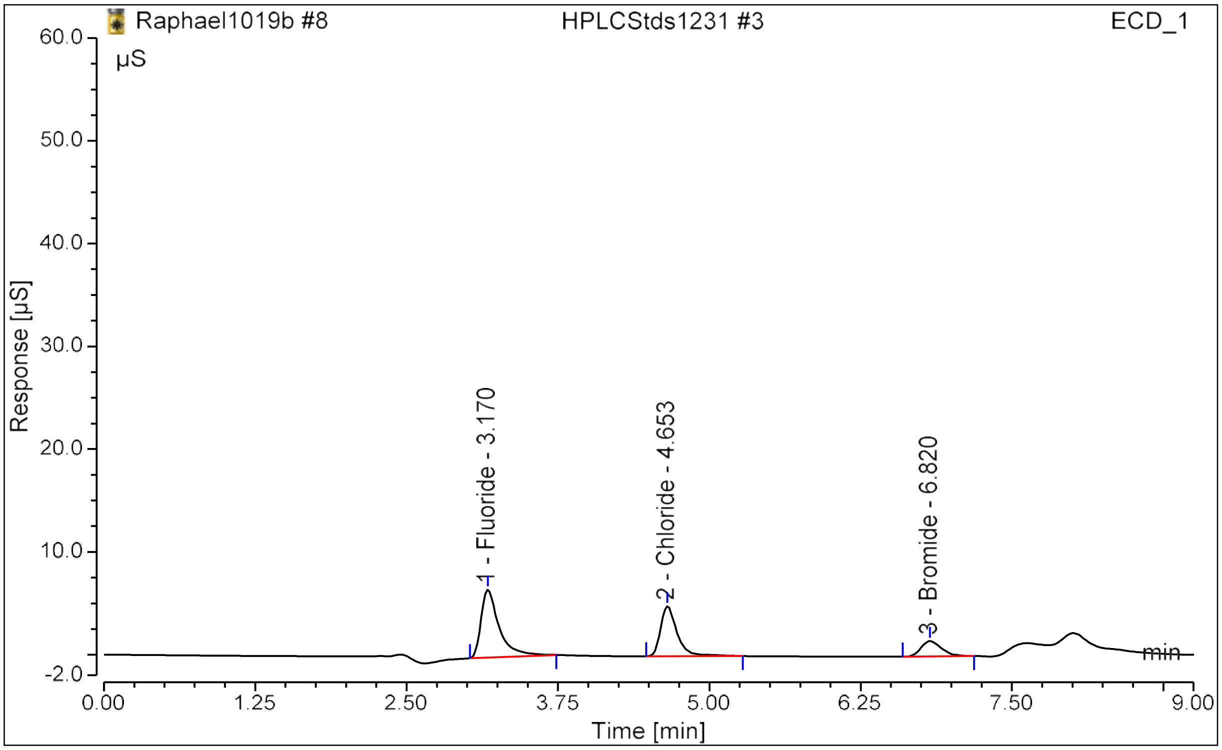


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	1.137	6.522	4.70718	FALSE	FALSE
2	4.65	Chloride	0.771	4.851	4.80440	FALSE	FALSE
3	6.81	Bromide	0.291	1.487	4.81317	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**14-Dec-2021 / 15:57**	Run Time:	**14.50**

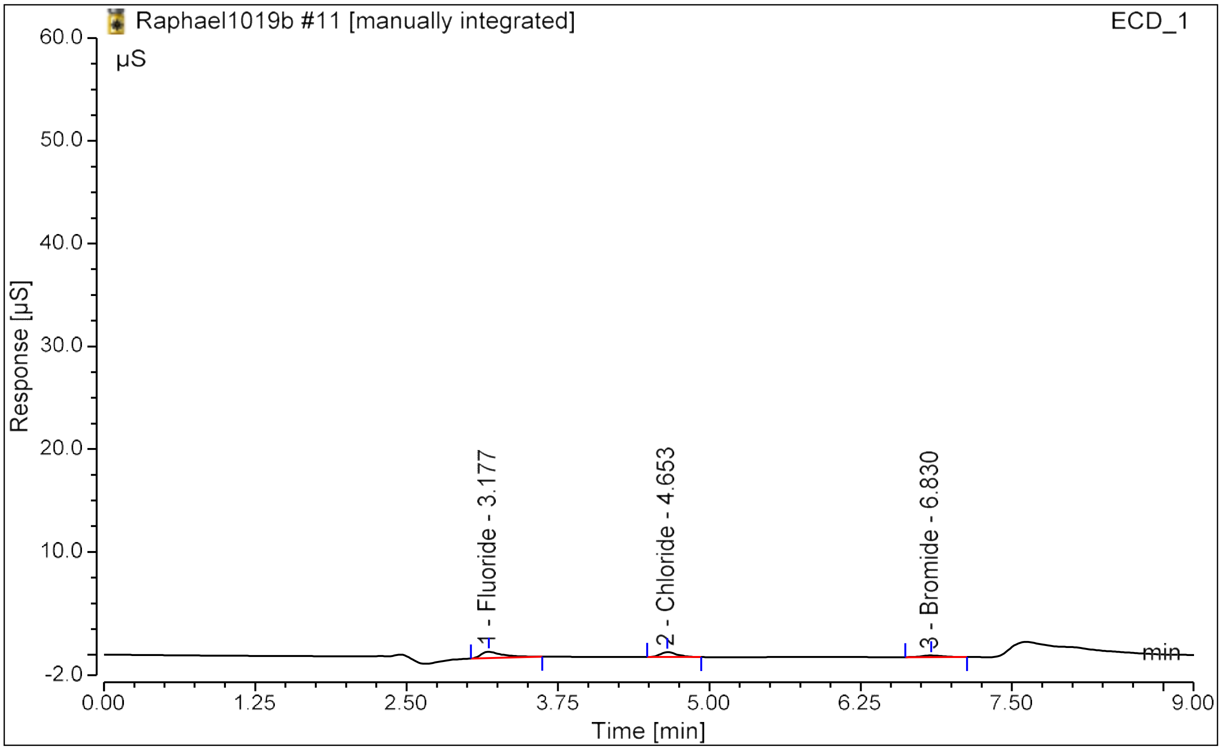


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	1.144	6.574	4.73608	FALSE	FALSE
2	4.65	Chloride	0.778	4.868	4.84474	FALSE	FALSE
3	6.82	Bromide	0.293	1.495	4.84370	FALSE	FALSE

Peak Analysis Report

Sample Name:	**Raphael1019 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 11:37**	Run Time:	**14.50**

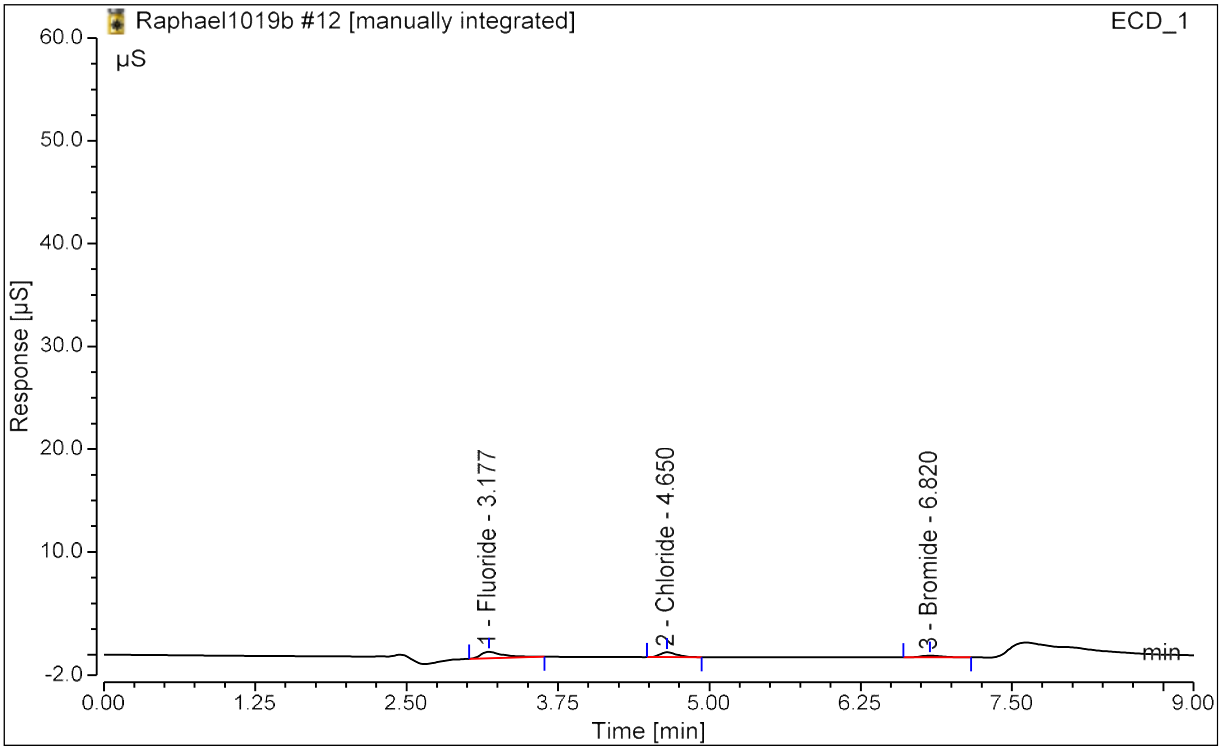


Analyst Comment: II PRM 12/16/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	0.127	0.605	0.50788	FALSE	TRUE
2	4.65	Chloride	0.076	0.484	0.52553	FALSE	TRUE
3	6.83	Bromide	0.030	0.151	0.50580	FALSE	FALSE

Peak Analysis Report

Sample Name:	**Raphael1019 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 11:54**	Run Time:	**14.50**

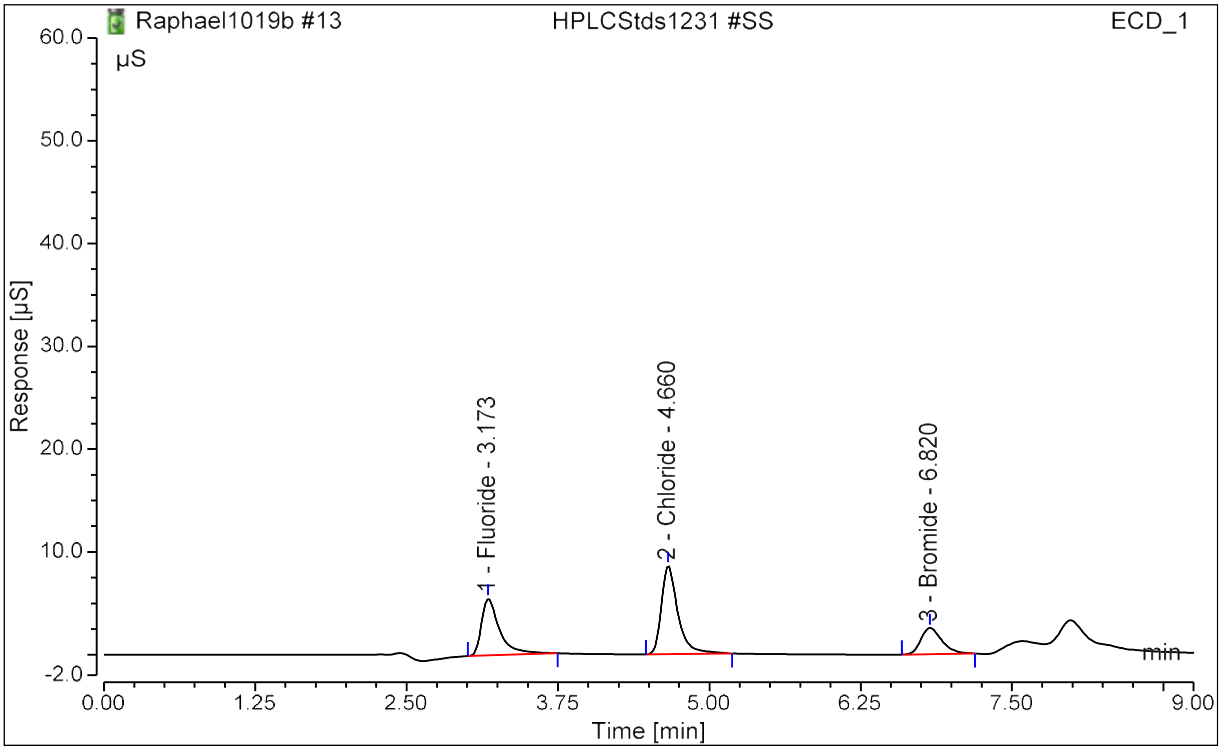


Analyst Comment: II PRM 12/16/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	0.132	0.614	0.52716	FALSE	TRUE
2	4.65	Chloride	0.075	0.478	0.51907	FALSE	TRUE
3	6.82	Bromide	0.030	0.151	0.50648	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 14:09**	Run Time:	**14.50**

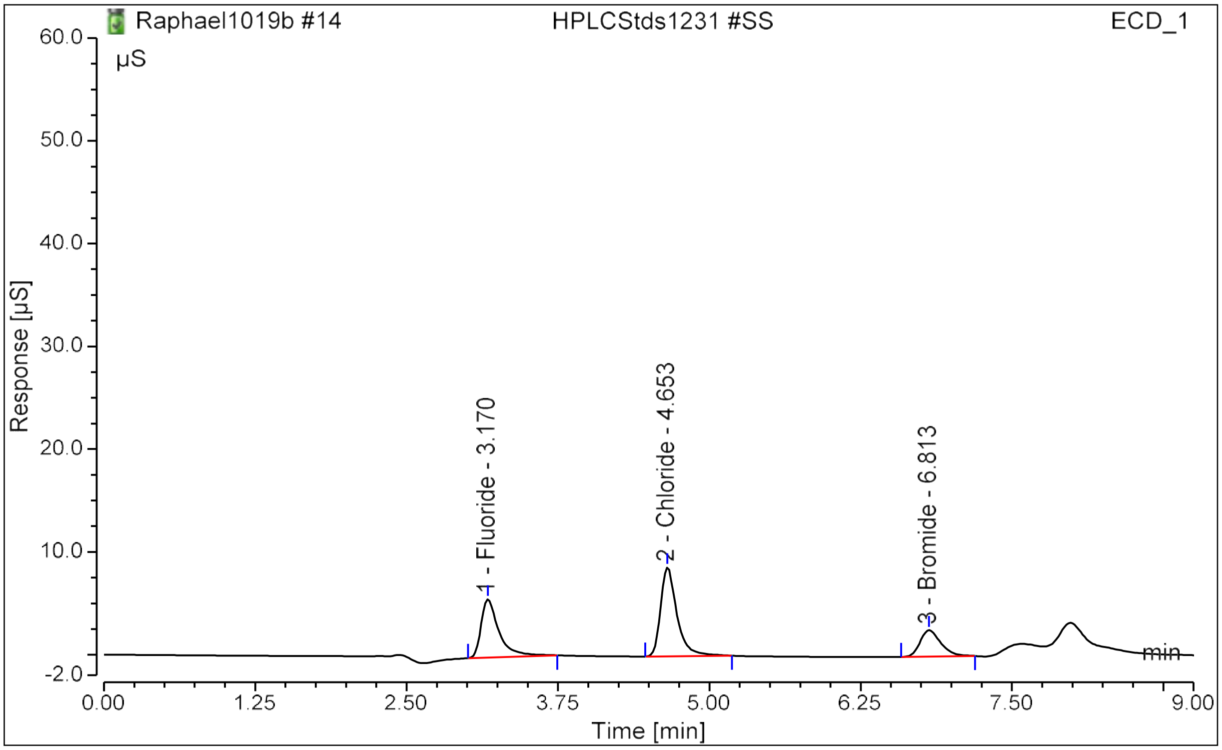


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.963	5.521	3.99265	FALSE	FALSE
2	4.66	Chloride	1.349	8.580	8.22169	FALSE	FALSE
3	6.82	Bromide	0.507	2.544	8.27785	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 14:25**	Run Time:	**14.50**

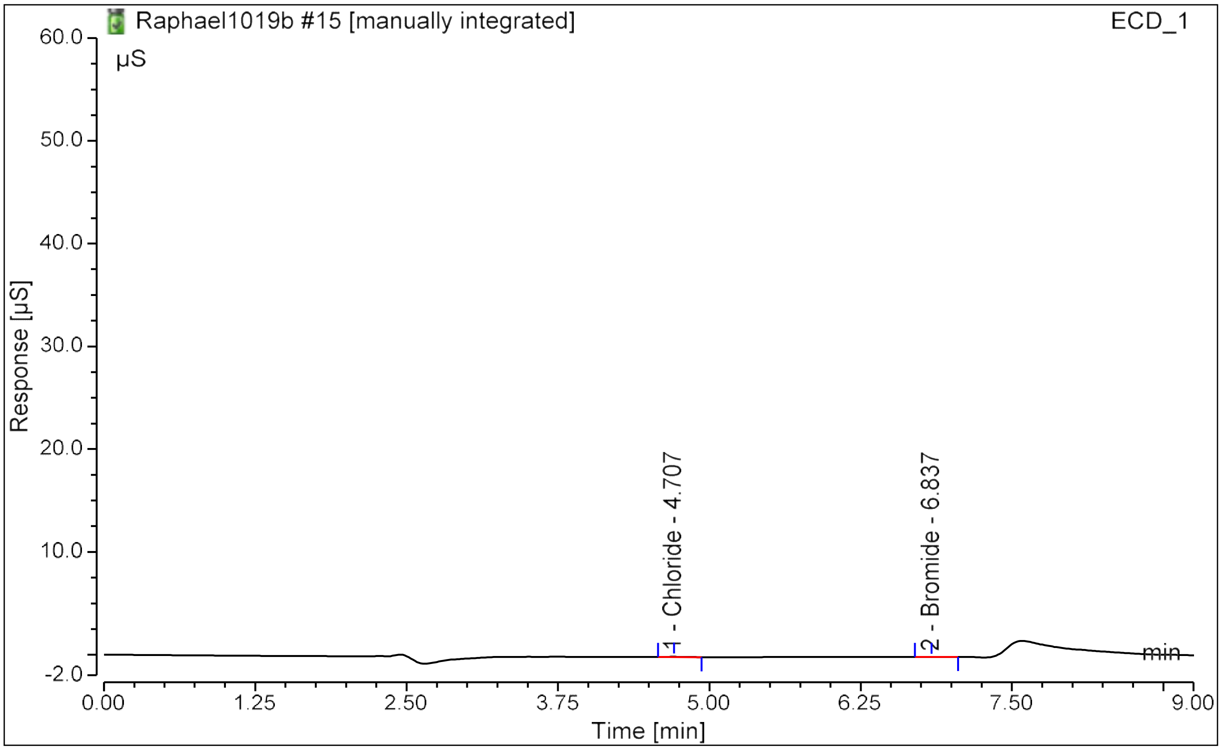


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.967	5.635	4.01200	FALSE	FALSE
2	4.65	Chloride	1.362	8.661	8.30105	FALSE	FALSE
3	6.81	Bromide	0.511	2.561	8.34082	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 14:41**	Run Time:	**14.50**

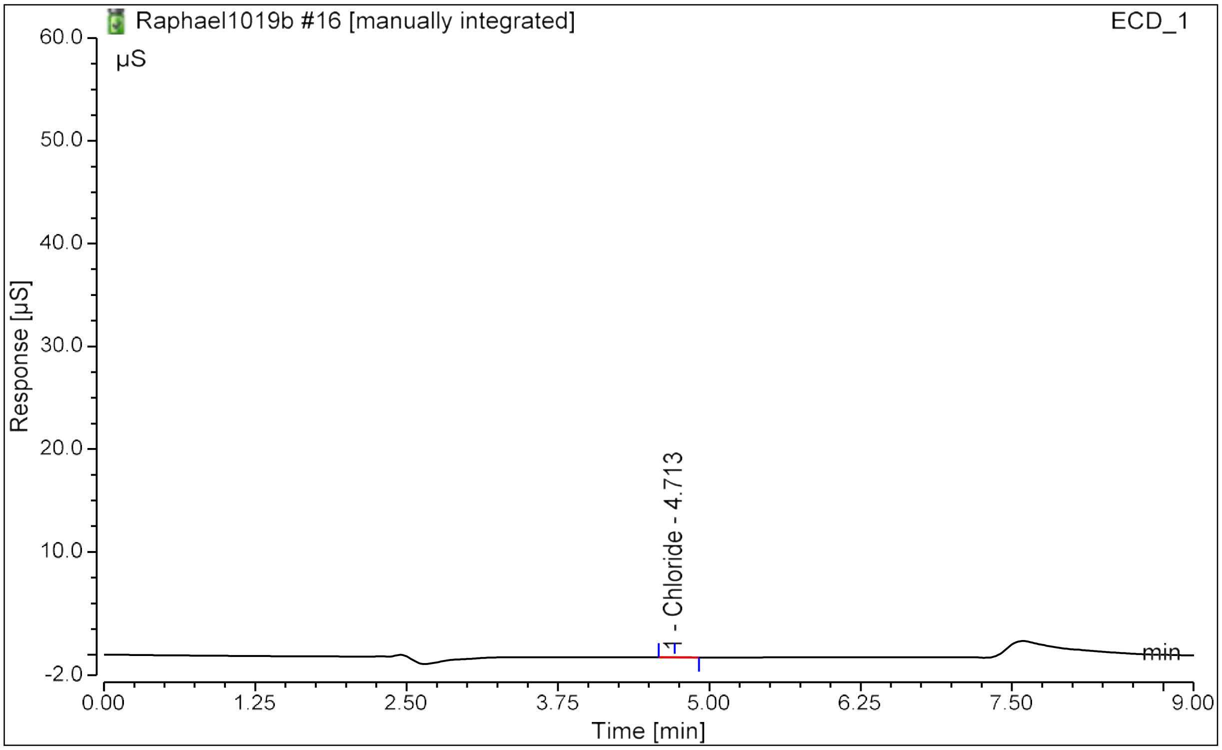


Analyst Comment: NI PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.71	Chloride	0.003	0.020	0.06722	FALSE	TRUE
2	6.84	Bromide	0.000	0.002	0.01405	FALSE	TRUE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**15-Dec-2021 / 14:57**	Run Time:	**14.50**

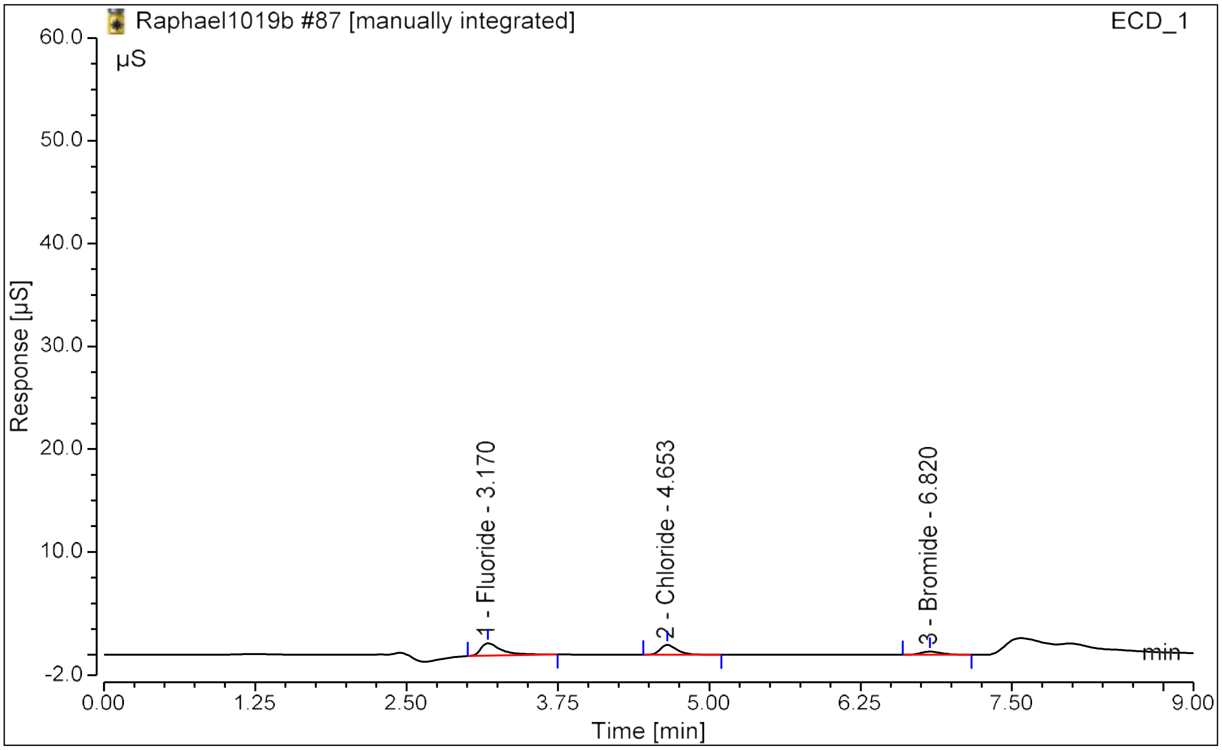


Analyst Comment: NI PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
n.a.	n.a.	Fluoride	n.a.	n.a.	n.a.	n.a.	n.a.
1	4.71	Chloride	0.003	0.020	0.06703	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Peak Analysis Report

Sample Name:	**HPLCStds1231 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 10:20**	Run Time:	**14.50**

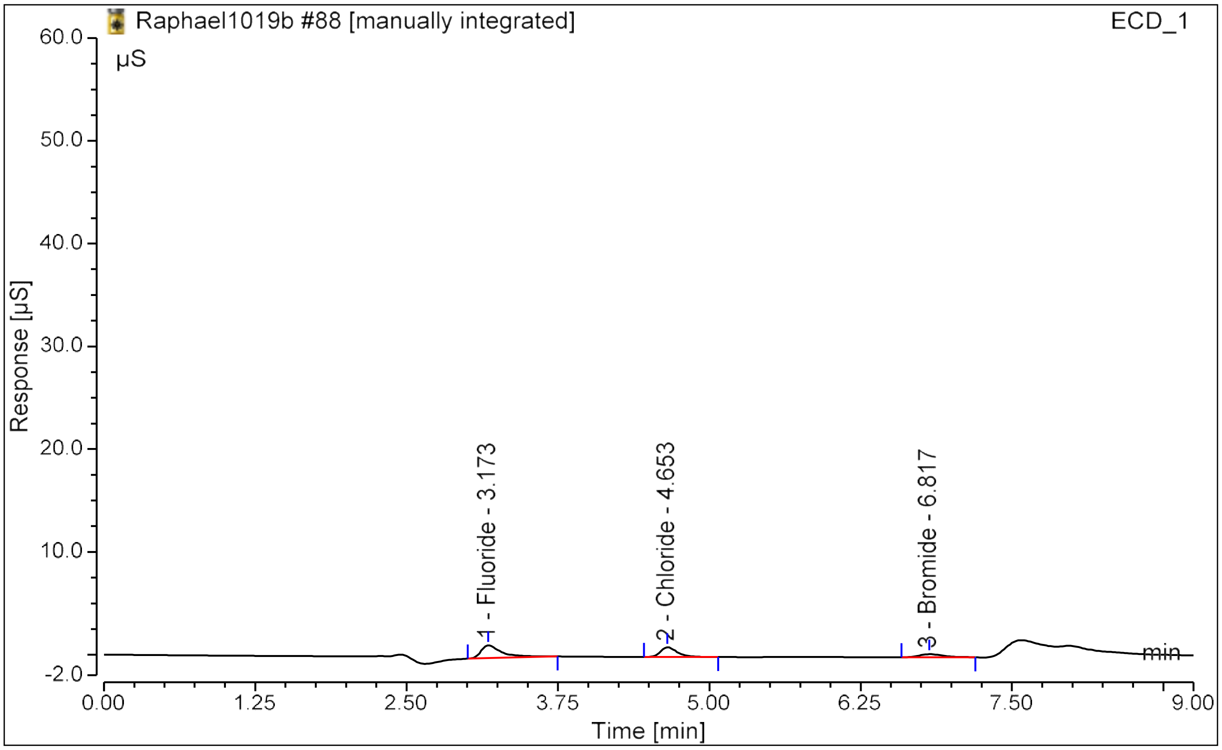


Analyst Comment: II PRM 12/16/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.243	1.219	0.99750	FALSE	FALSE
2	4.65	Chloride	0.150	0.944	0.99001	FALSE	TRUE
3	6.82	Bromide	0.059	0.299	1.00055	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 10:36**	Run Time:	**14.50**

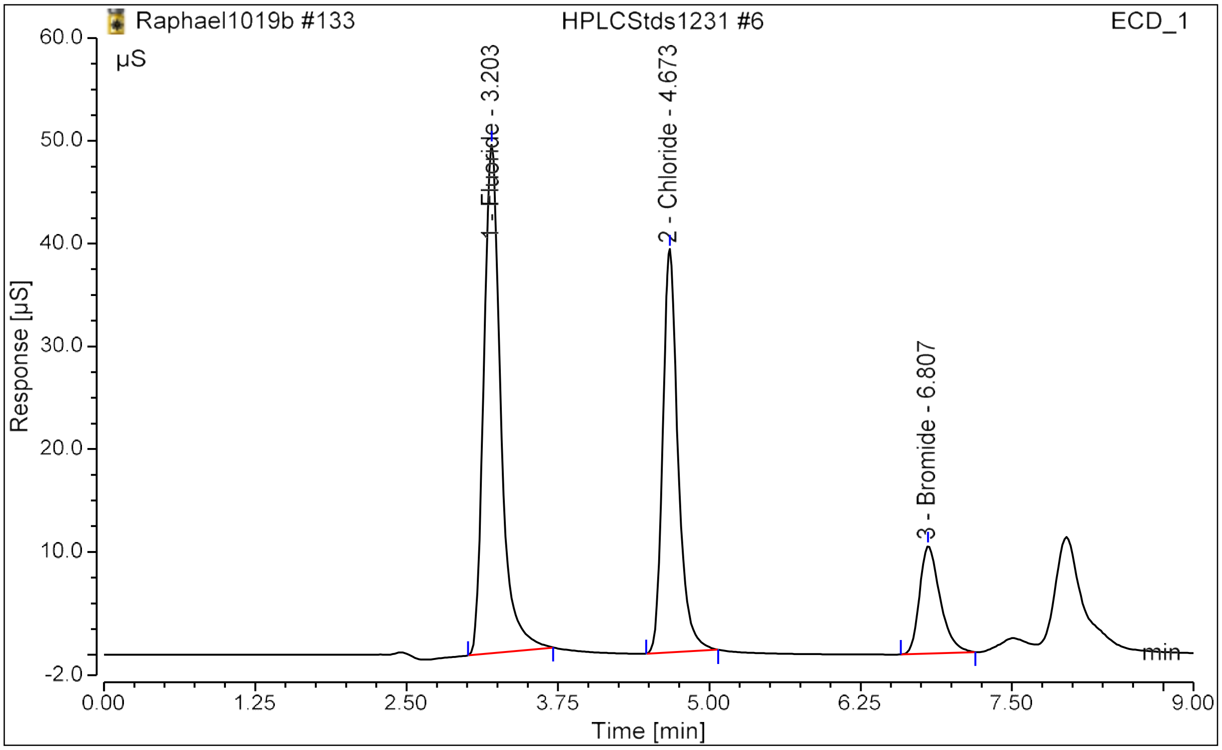


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	0.248	1.231	1.01677	FALSE	FALSE
2	4.65	Chloride	0.149	0.945	0.98561	FALSE	TRUE
3	6.82	Bromide	0.062	0.308	1.05142	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 22:45**	Run Time:	**14.50**

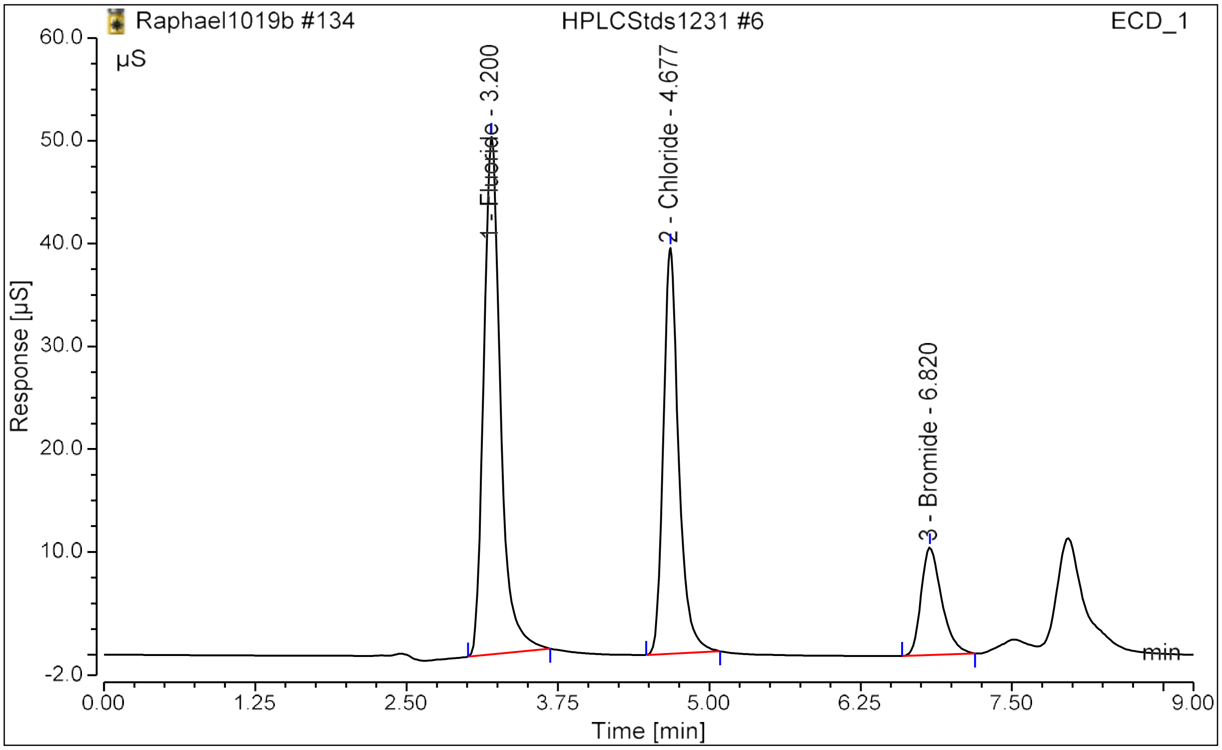


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.20	Fluoride	8.087	49.475	30.24841	FALSE	FALSE
2	4.67	Chloride	5.731	39.235	30.26028	FALSE	FALSE
3	6.81	Bromide	2.054	10.470	30.60553	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 23:01**	Run Time:	**14.50**

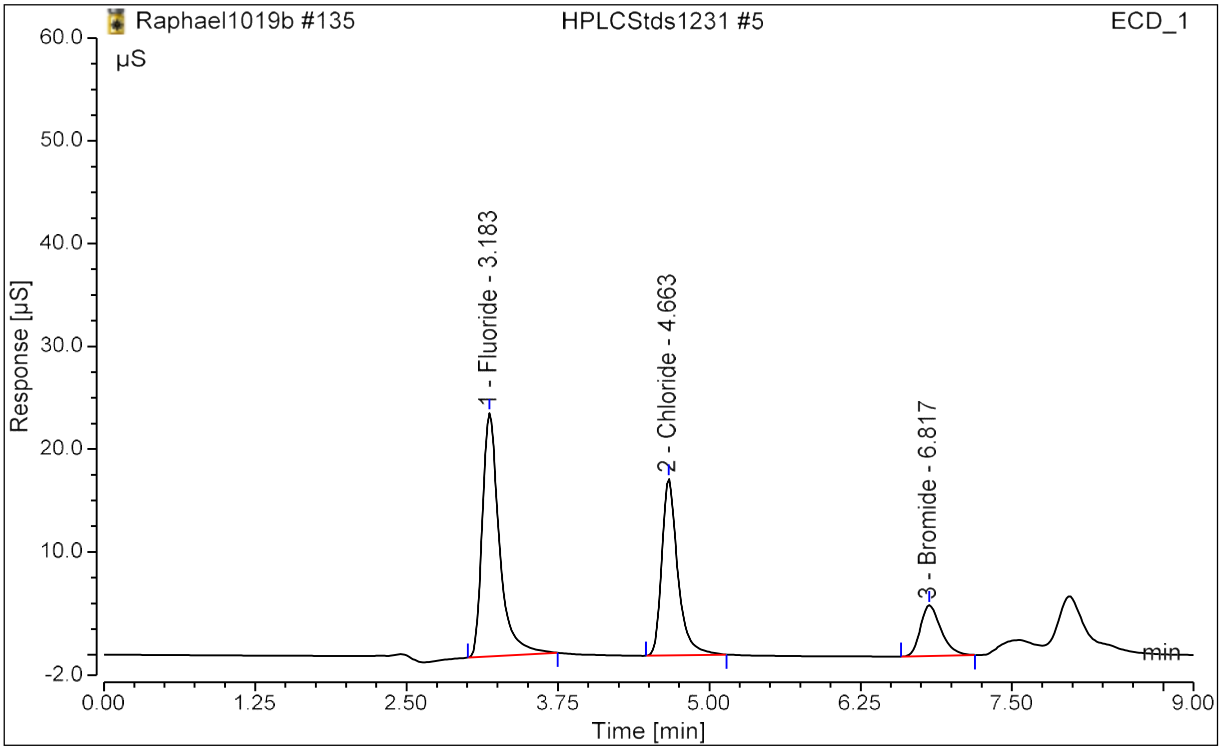


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.20	Fluoride	8.115	50.378	30.33724	FALSE	FALSE
2	4.68	Chloride	5.799	39.514	30.54867	FALSE	FALSE
3	6.82	Bromide	2.056	10.468	30.63466	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 23:17**	Run Time:	**14.50**

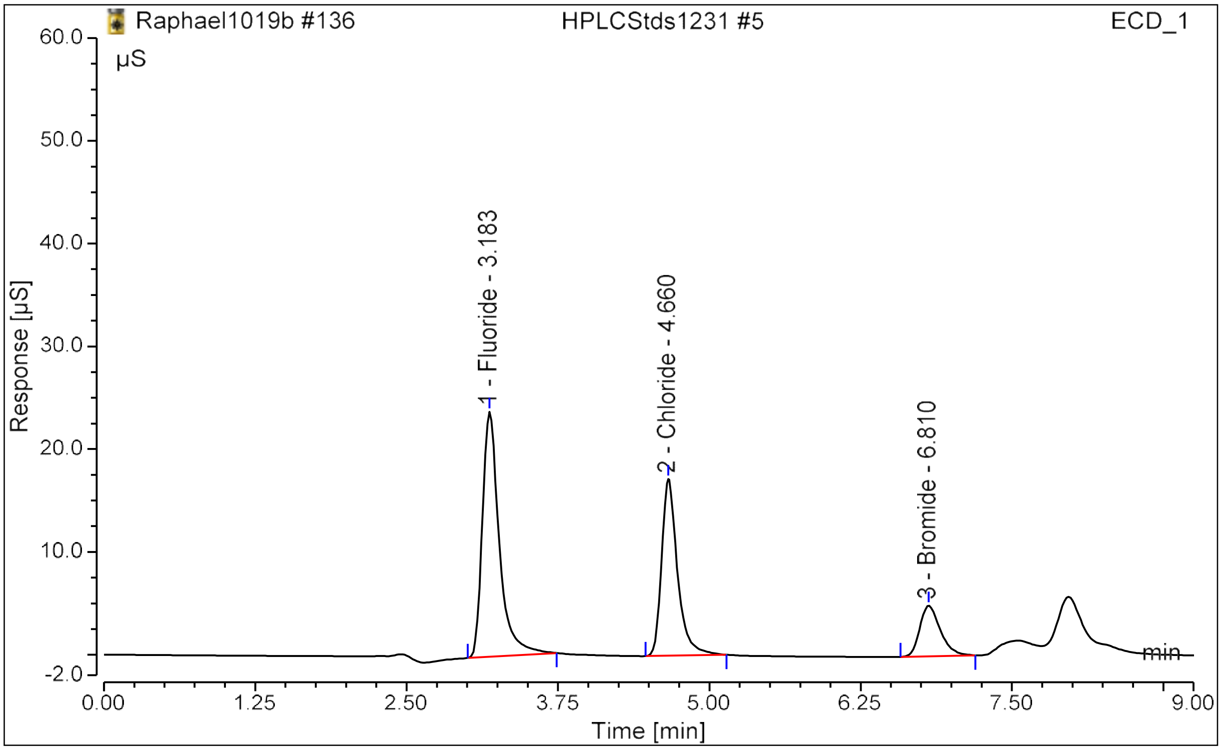


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	3.873	23.705	15.46584	FALSE	FALSE
2	4.66	Chloride	2.622	17.198	15.33876	FALSE	FALSE
3	6.82	Bromide	0.975	4.931	15.50558	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 23:34**	Run Time:	**14.50**

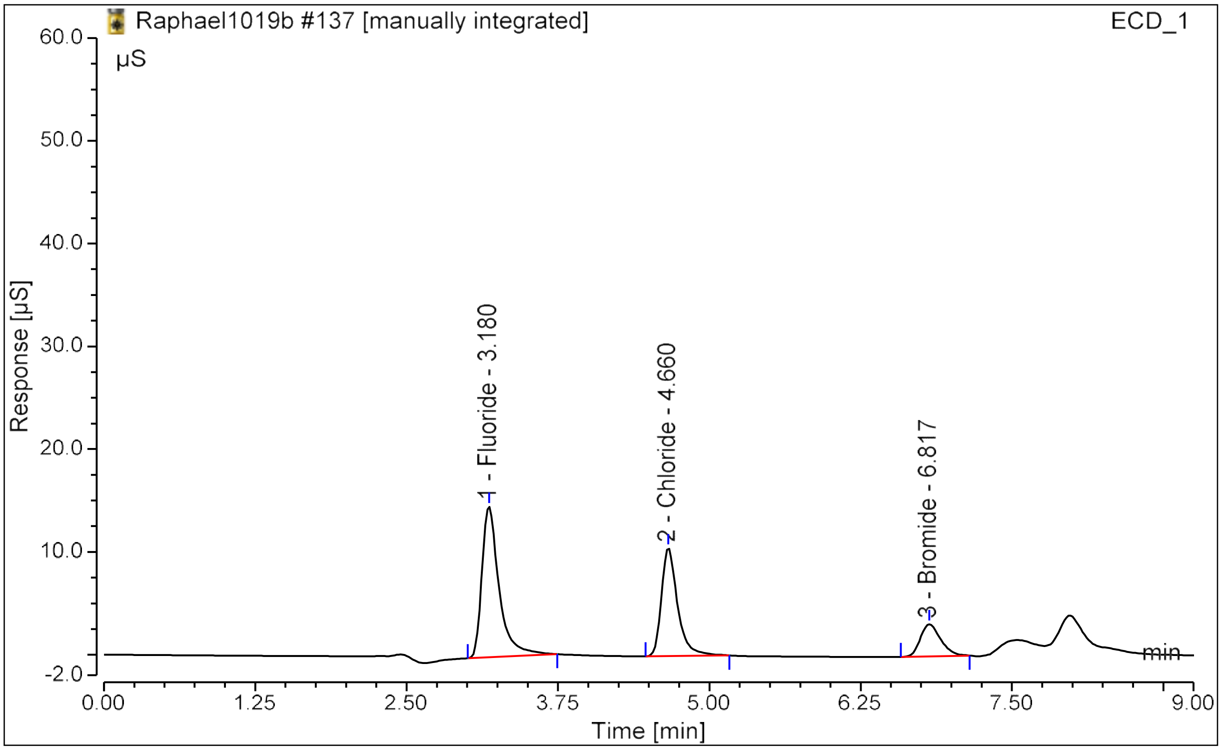


Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	3.857	23.837	15.40608	FALSE	FALSE
2	4.66	Chloride	2.615	17.185	15.30124	FALSE	FALSE
3	6.81	Bromide	0.976	4.936	15.51492	FALSE	FALSE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**16-Dec-2021 / 23:50**	Run Time:	**14.50**

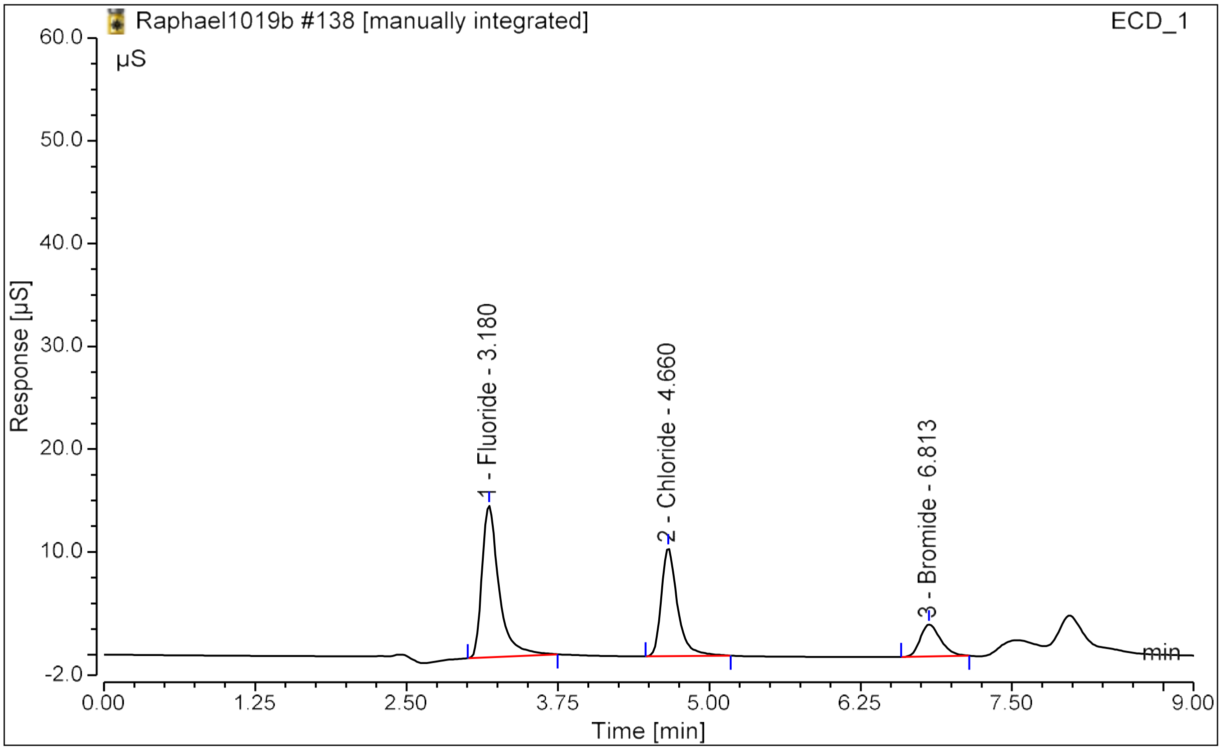


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	2.414	14.668	9.84460	FALSE	FALSE
2	4.66	Chloride	1.629	10.523	9.83784	FALSE	FALSE
3	6.82	Bromide	0.609	3.131	9.89209	FALSE	TRUE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**17-Dec-2021 / 00:06**	Run Time:	**14.50**

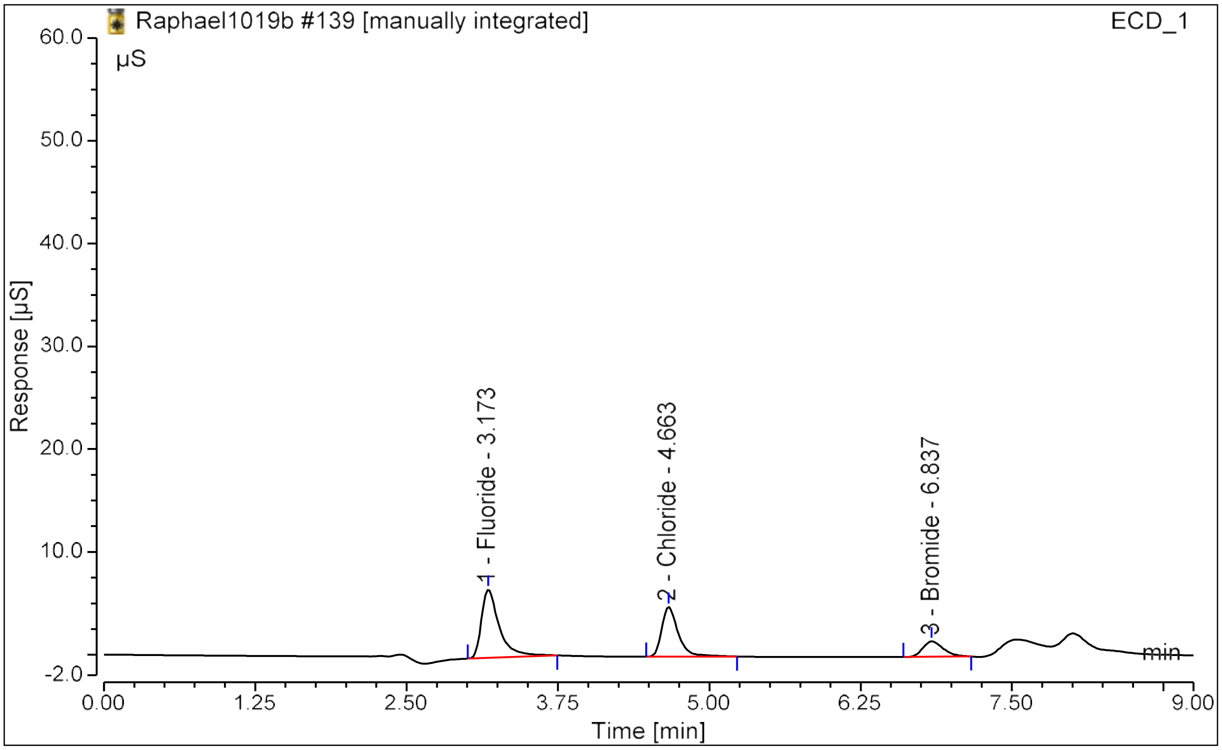


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	2.411	14.765	9.83362	FALSE	FALSE
2	4.66	Chloride	1.630	10.522	9.84332	FALSE	FALSE
3	6.81	Bromide	0.608	3.127	9.87722	FALSE	TRUE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**17-Dec-2021 / 00:22**	Run Time:	**14.50**

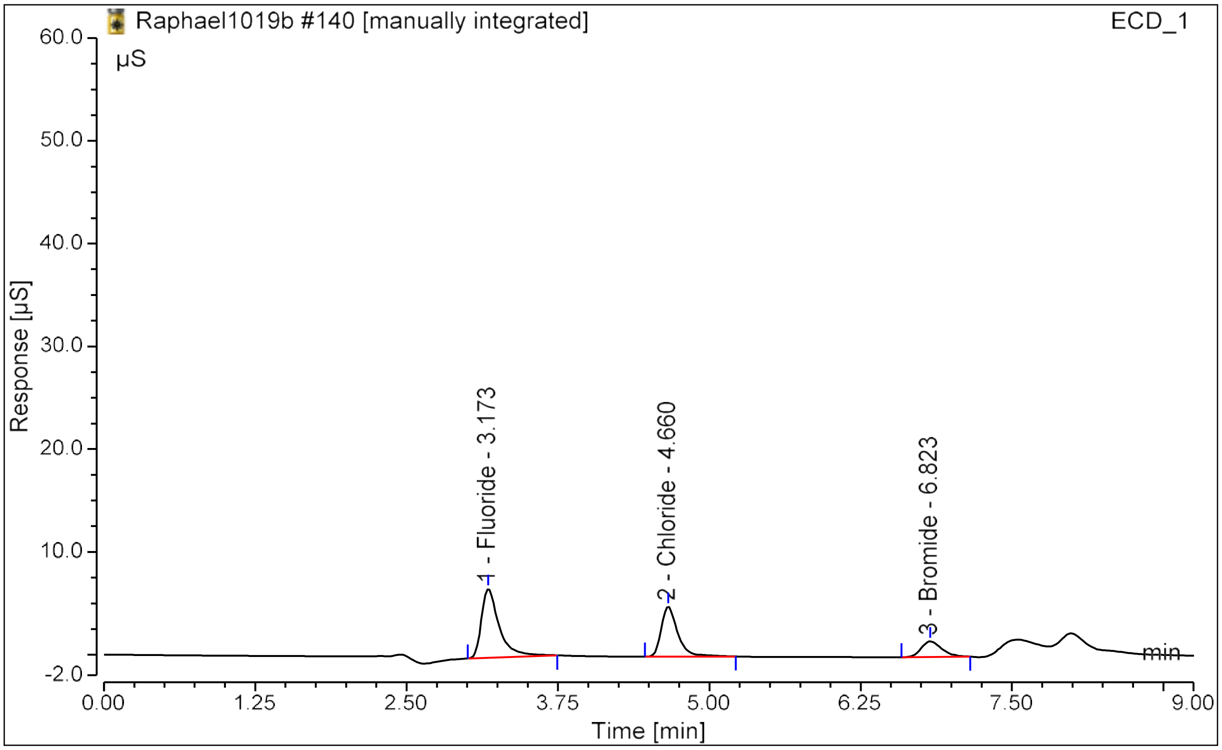


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	1.138	6.633	4.71349	FALSE	FALSE
2	4.66	Chloride	0.767	4.855	4.77551	FALSE	TRUE
3	6.84	Bromide	0.295	1.507	4.87728	FALSE	TRUE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**17-Dec-2021 / 00:38**	Run Time:	**14.50**

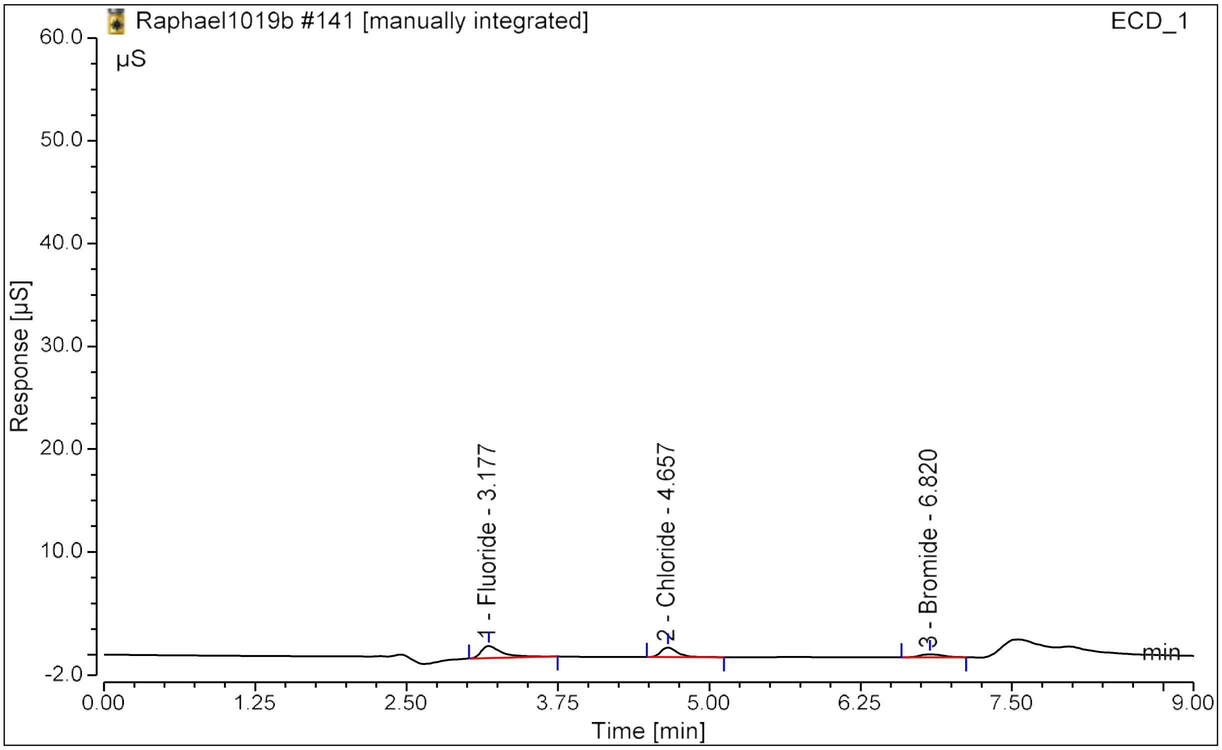


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.17	Fluoride	1.144	6.687	4.73924	FALSE	FALSE
2	4.66	Chloride	0.771	4.871	4.79972	FALSE	FALSE
3	6.82	Bromide	0.297	1.515	4.90617	FALSE	TRUE

Peak Analysis Report

Sample Name:	**HPLCStds1231 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**17-Dec-2021 / 00:55**	Run Time:	**14.50**

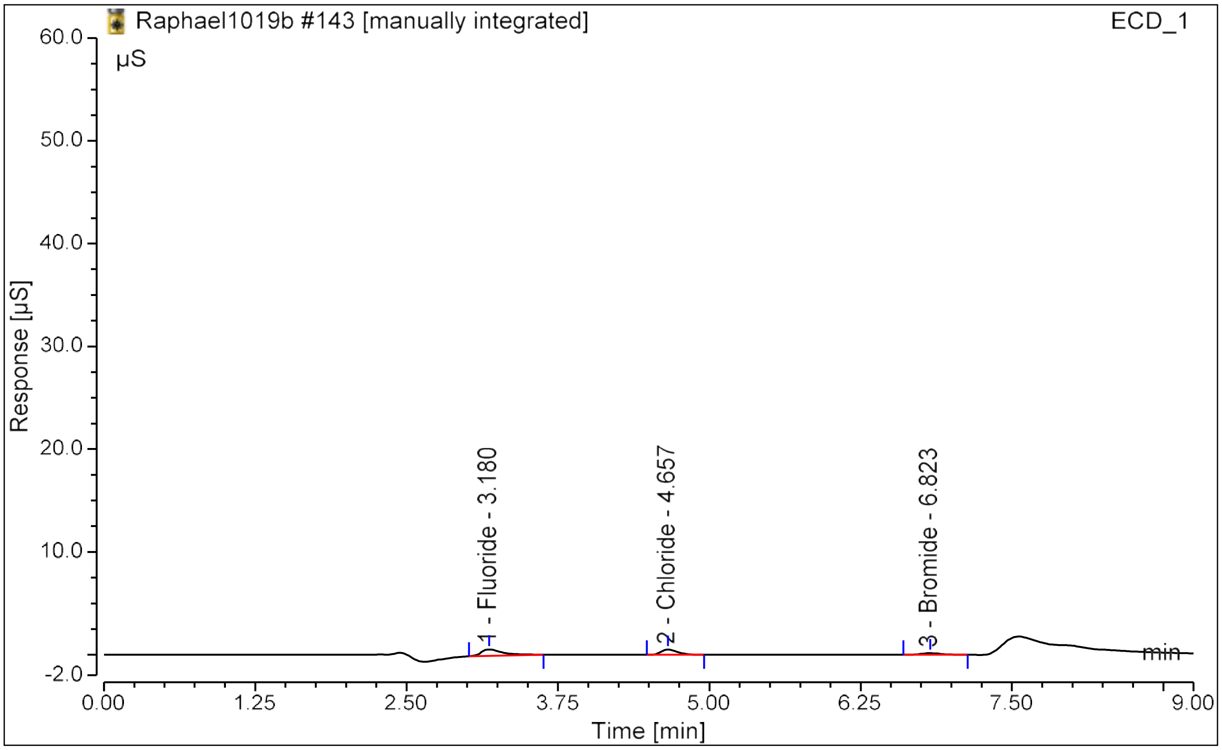


Analyst Comment: Report single inj, II PRM 12/20/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	0.235	1.172	0.96169	FALSE	FALSE
2	4.66	Chloride	0.146	0.934	0.96304	FALSE	FALSE
3	6.82	Bromide	0.058	0.300	0.97994	FALSE	TRUE

Peak Analysis Report

Sample Name:	**Raphael1019 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**17-Dec-2021 / 01:27**	Run Time:	**14.50**

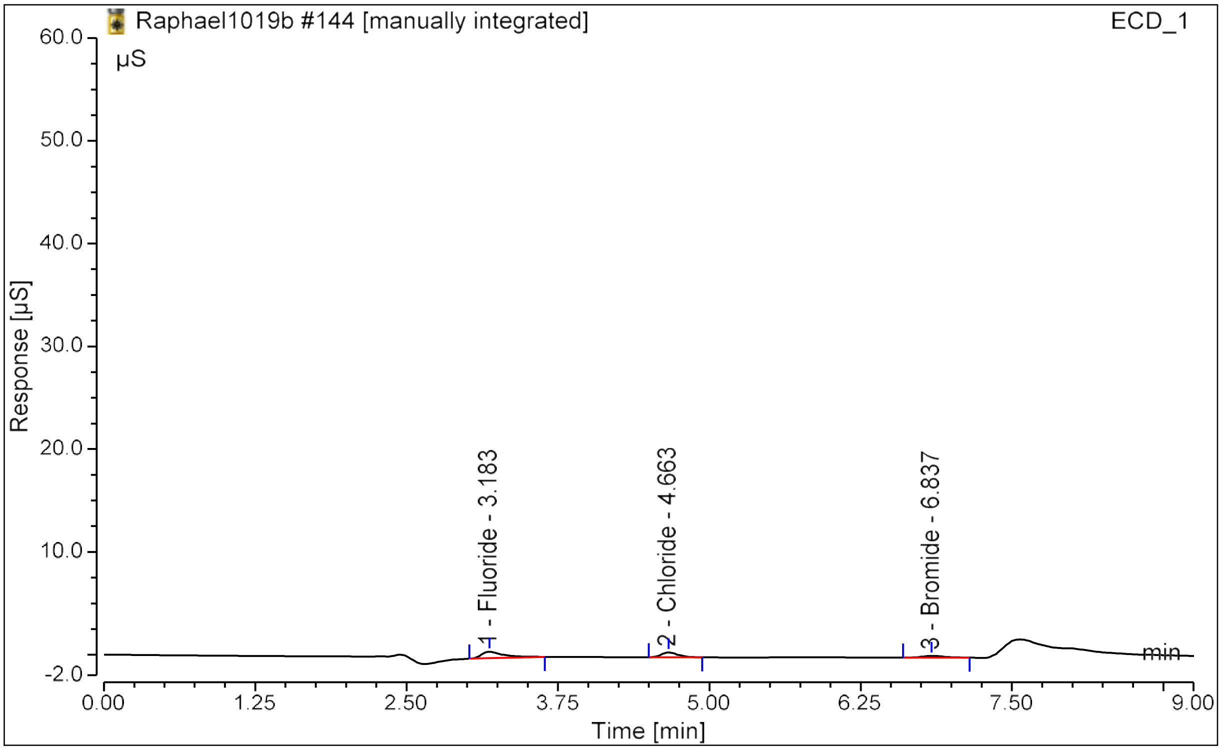


Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	0.131	0.612	0.52394	FALSE	TRUE
2	4.66	Chloride	0.074	0.476	0.51621	FALSE	TRUE
3	6.82	Bromide	0.029	0.150	0.49533	FALSE	TRUE

Peak Analysis Report

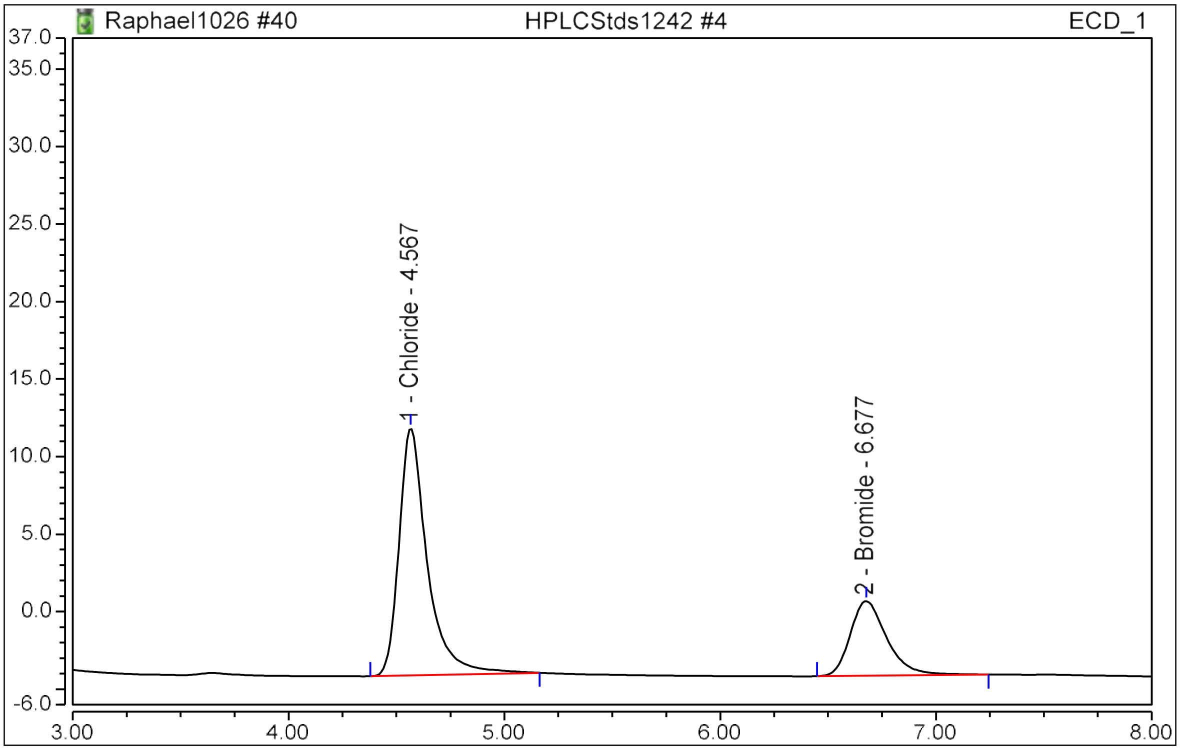
Sample Name:	**Raphael1019 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP**	Operator:	**PMann**
Inj. Date / Time:	**17-Dec-2021 / 01:43**	Run Time:	**14.50**



Analyst Comment: II PRM 12/17/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	3.18	Fluoride	0.130	0.613	0.52012	FALSE	TRUE
2	4.66	Chloride	0.074	0.477	0.51405	FALSE	TRUE
3	6.84	Bromide	0.030	0.154	0.51188	FALSE	TRUE

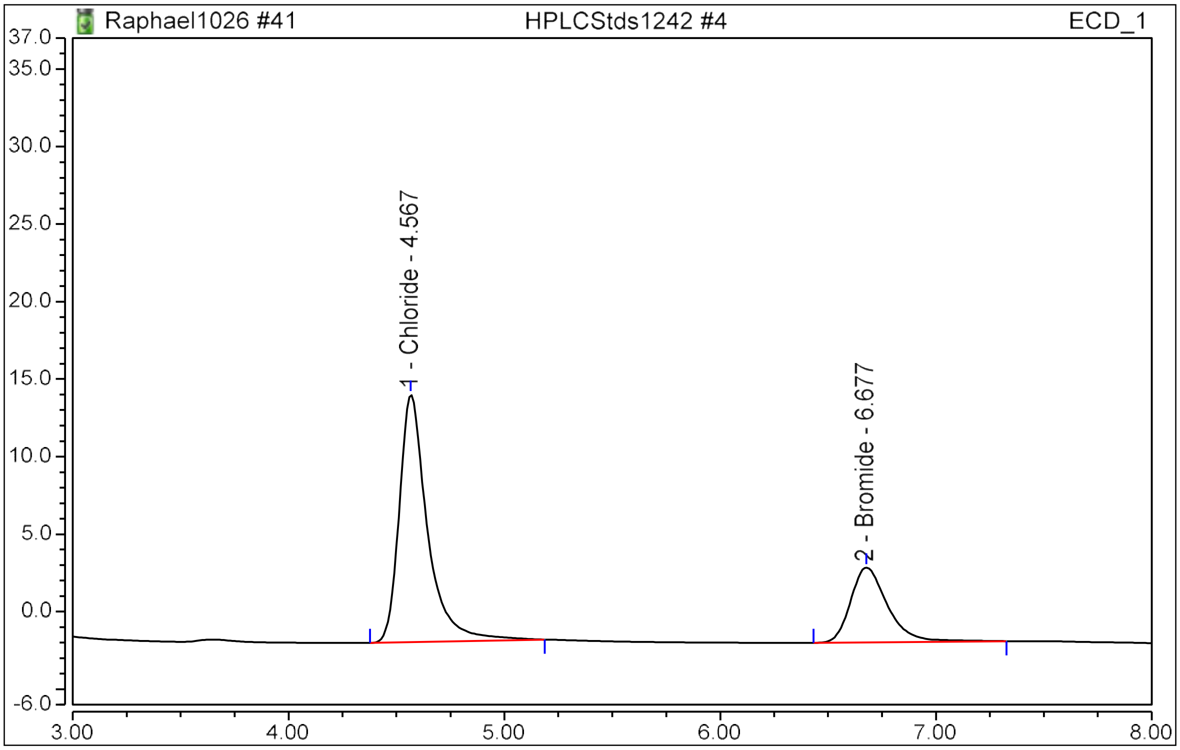
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 10:23**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	2.418	15.956	15.14138	FALSE	FALSE
2	6.68	Bromide	0.947	4.819	14.72499	FALSE	FALSE

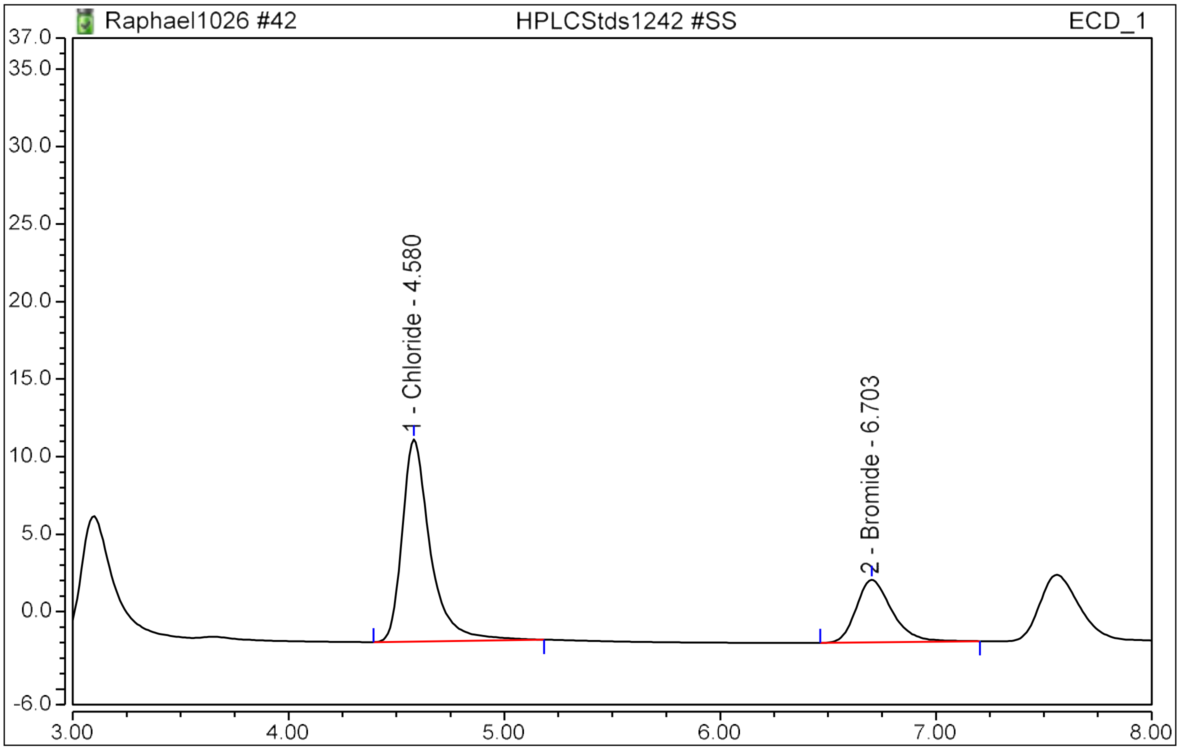
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 10:53**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	2.423	15.960	15.16720	FALSE	FALSE
2	6.68	Bromide	0.959	4.833	14.88528	FALSE	FALSE

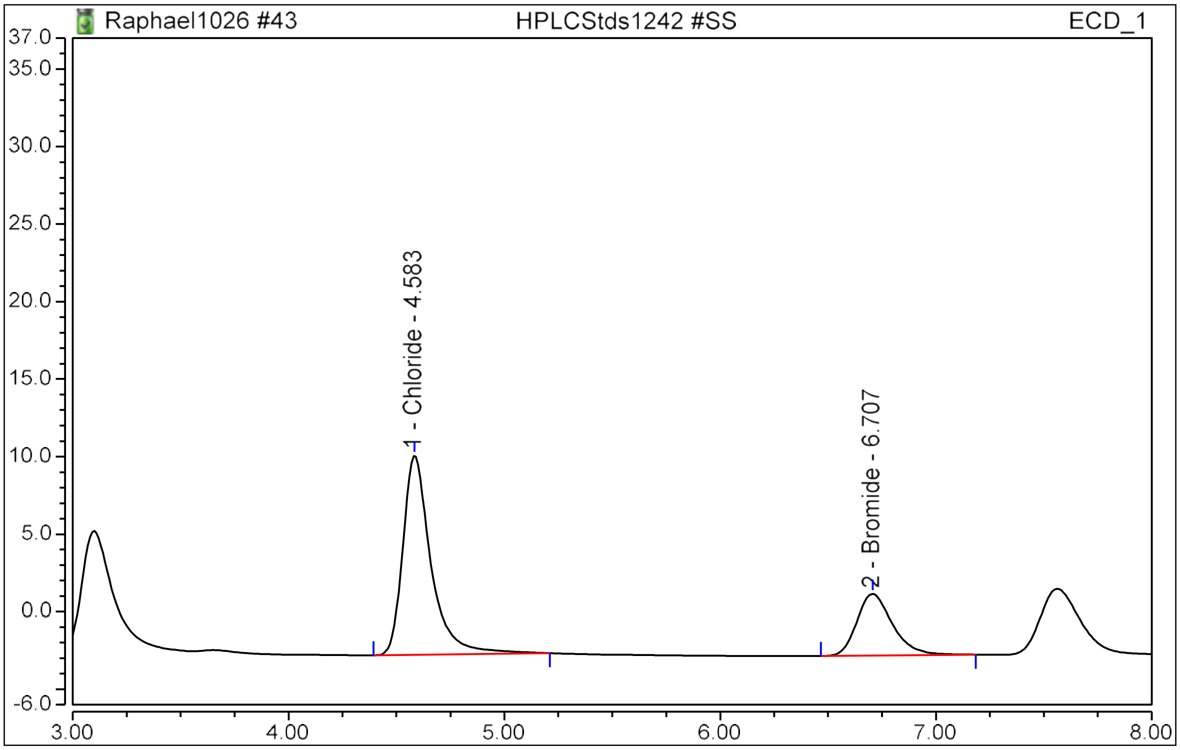
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 11:23**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	1.968	13.042	12.53496	FALSE	FALSE
2	6.70	Bromide	0.771	4.023	12.22415	FALSE	FALSE

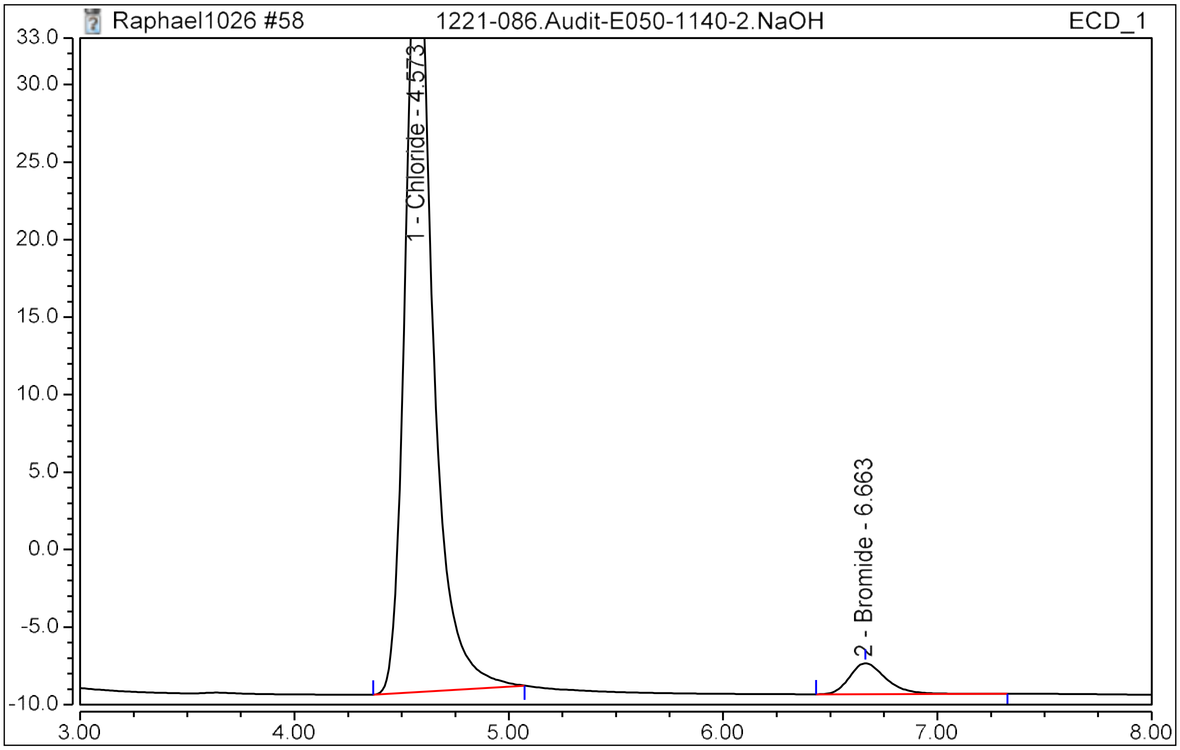
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 11:52**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	1.948	12.875	12.42156	FALSE	FALSE
2	6.71	Bromide	0.761	3.984	12.07154	FALSE	FALSE

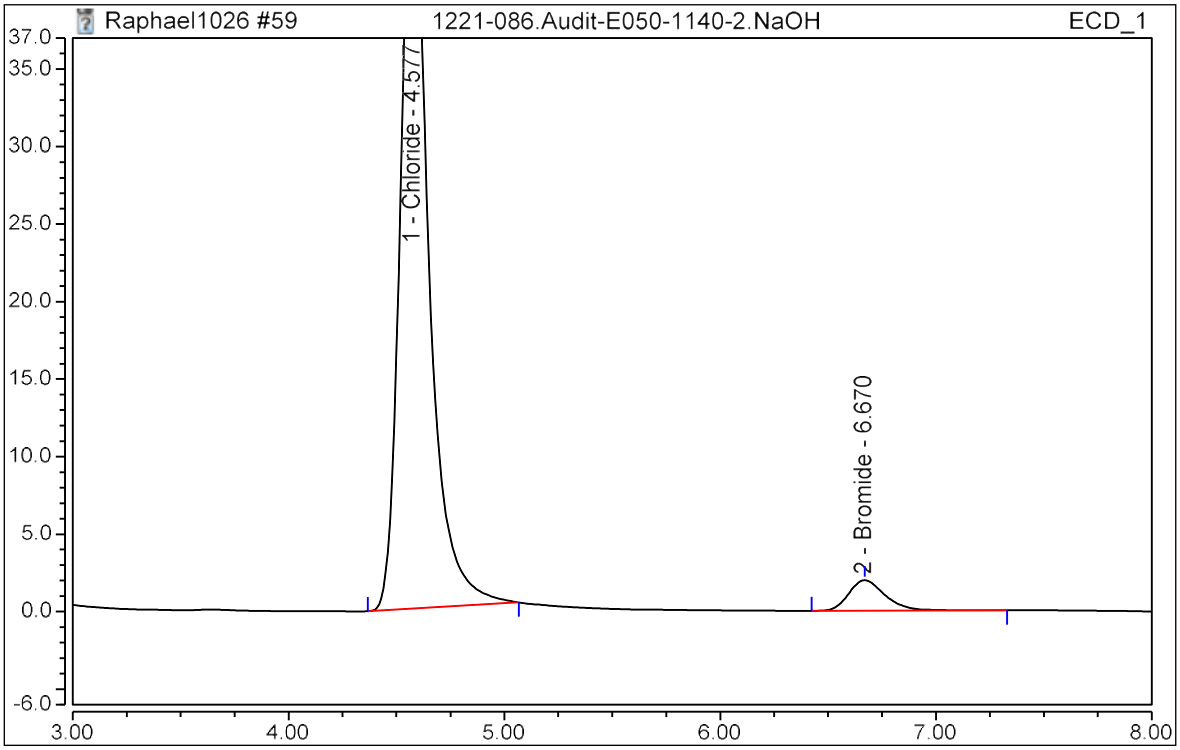
Sample Name:	**1221-086.Audit-E050-1140-2.NaOH**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 19:17**	Run Time:	**28.00**



Analyst Comment: Cl over, report Br

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	7.589	51.563	38.59480	FALSE	FALSE
2	6.66	Bromide	0.391	1.992	6.43664	FALSE	FALSE

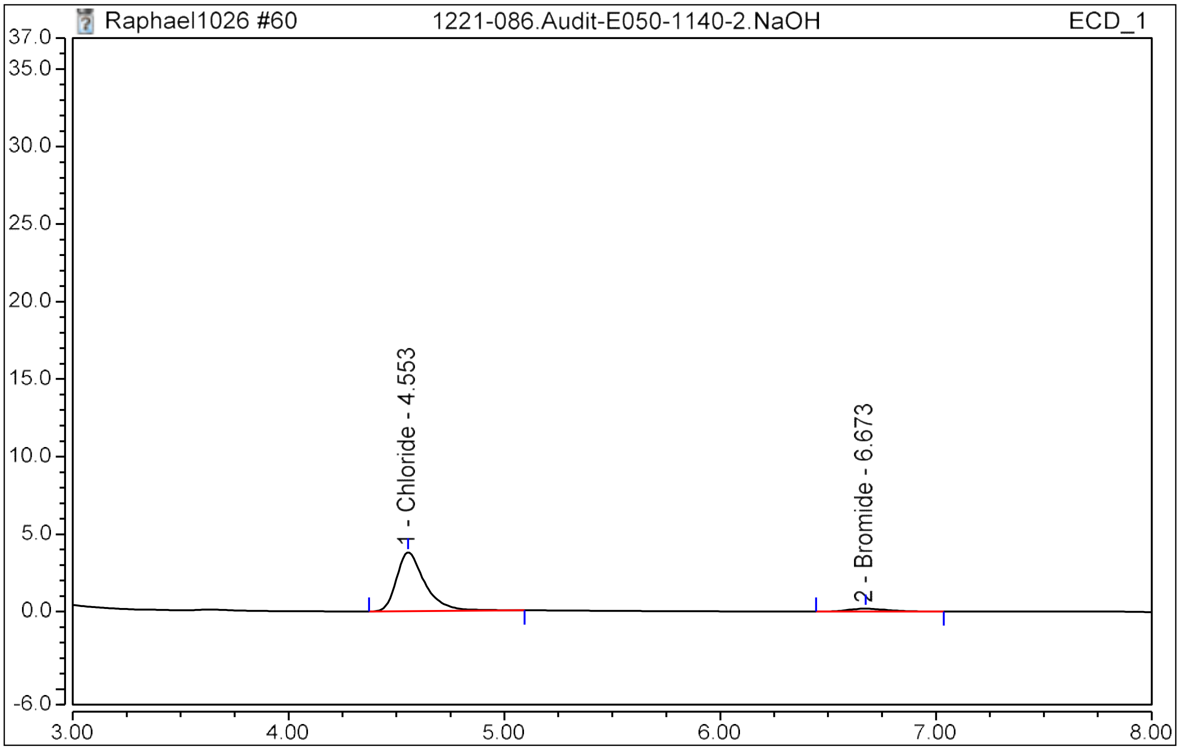
Sample Name:	**1221-086.Audit-E050-1140-2.NaOH**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 19:47**	Run Time:	**28.00**



Analyst Comment: Cl over, report Br

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	7.516	50.989	38.34507	FALSE	FALSE
2	6.67	Bromide	0.388	1.973	6.40050	FALSE	FALSE

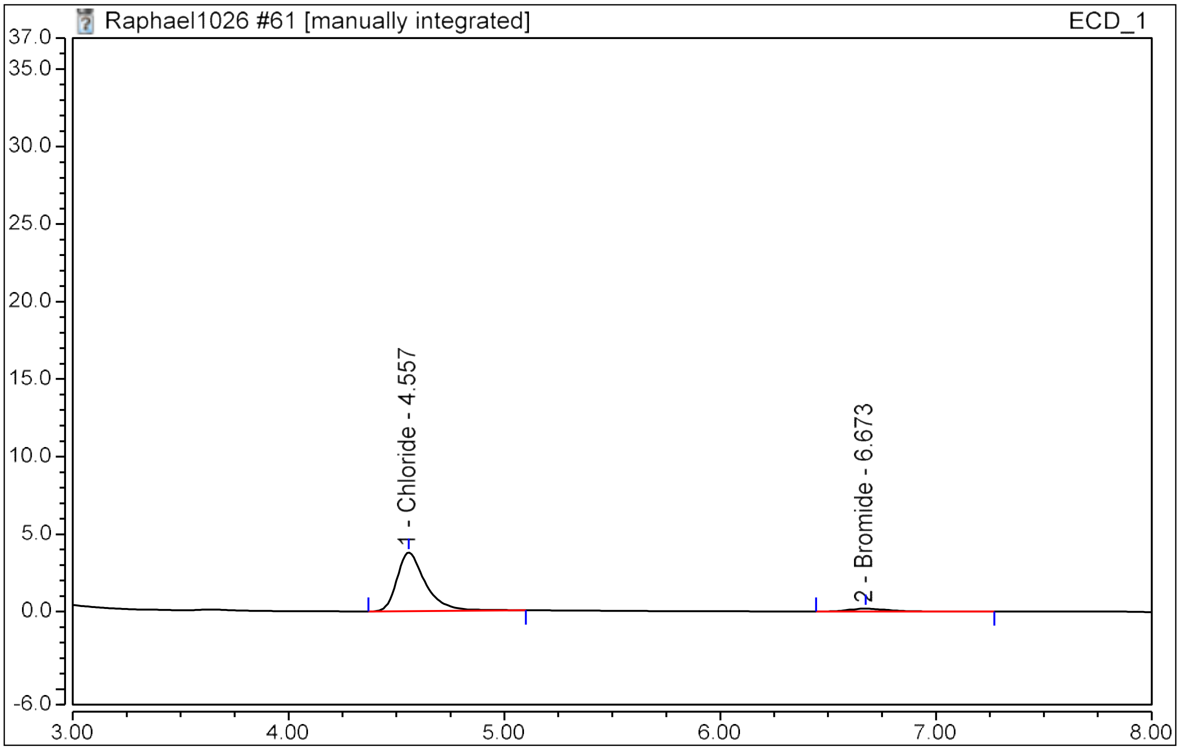
Sample Name:	**1221-086.Audit-E050-1140-2.NaOH**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**10.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 20:17**	Run Time:	**28.00**



Analyst Comment: Report Cl

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.579	3.796	3.93694	FALSE	FALSE
2	6.67	Bromide	0.037	0.194	0.61427	FALSE	FALSE

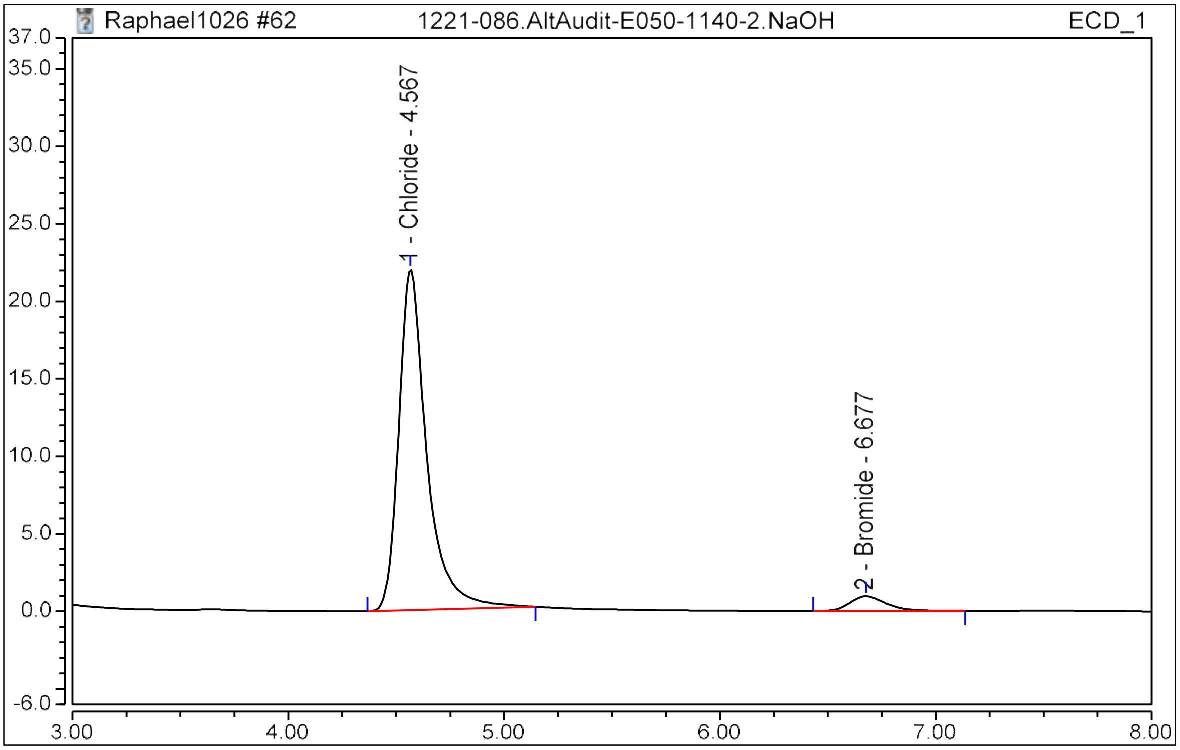
Sample Name:	**1221-086.Audit-E050-1140-2.NaOH**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**10.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 20:47**	Run Time:	**28.00**



Analyst Comment: Report Cl, II PRM 1/4/22

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	0.579	3.782	3.93381	FALSE	TRUE
2	6.67	Bromide	0.038	0.193	0.62466	FALSE	FALSE

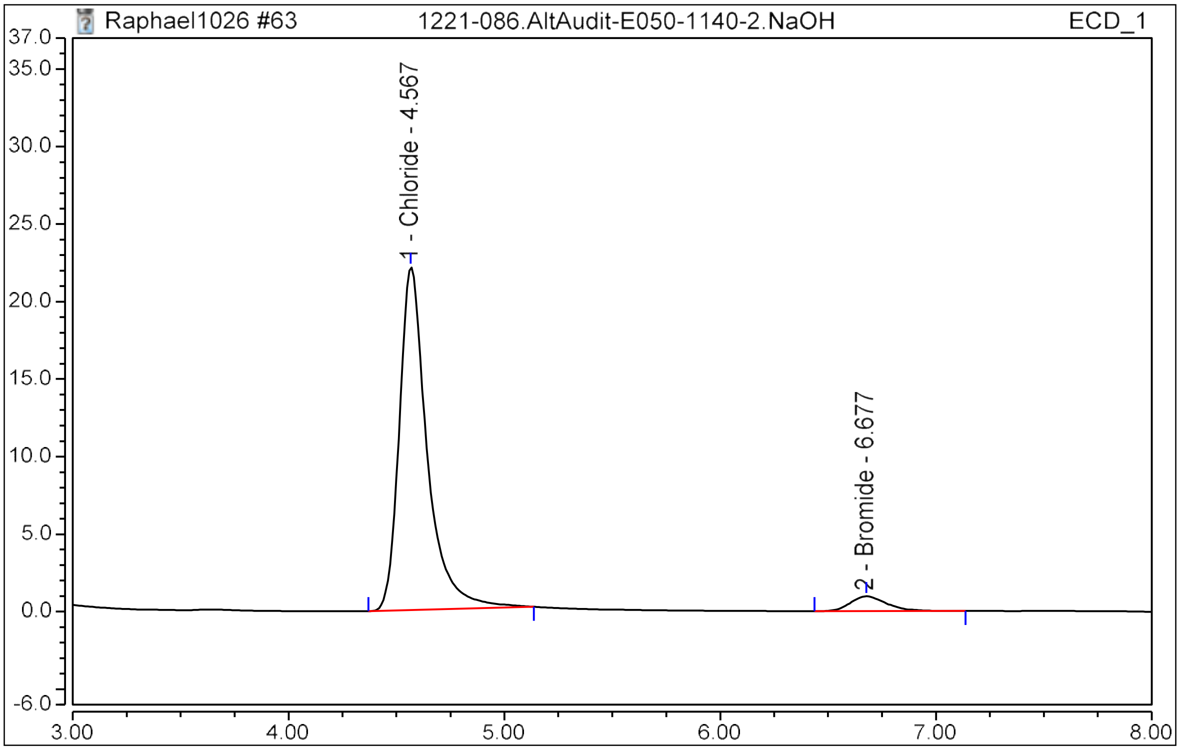
Sample Name:	**1221-086.AltAudit-E050-1140-2.NaOH**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 21:16**	Run Time:	**28.00**



Analyst Comment: Report both

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	3.306	21.982	20.01018	FALSE	FALSE
2	6.68	Bromide	0.185	0.949	3.10046	FALSE	FALSE

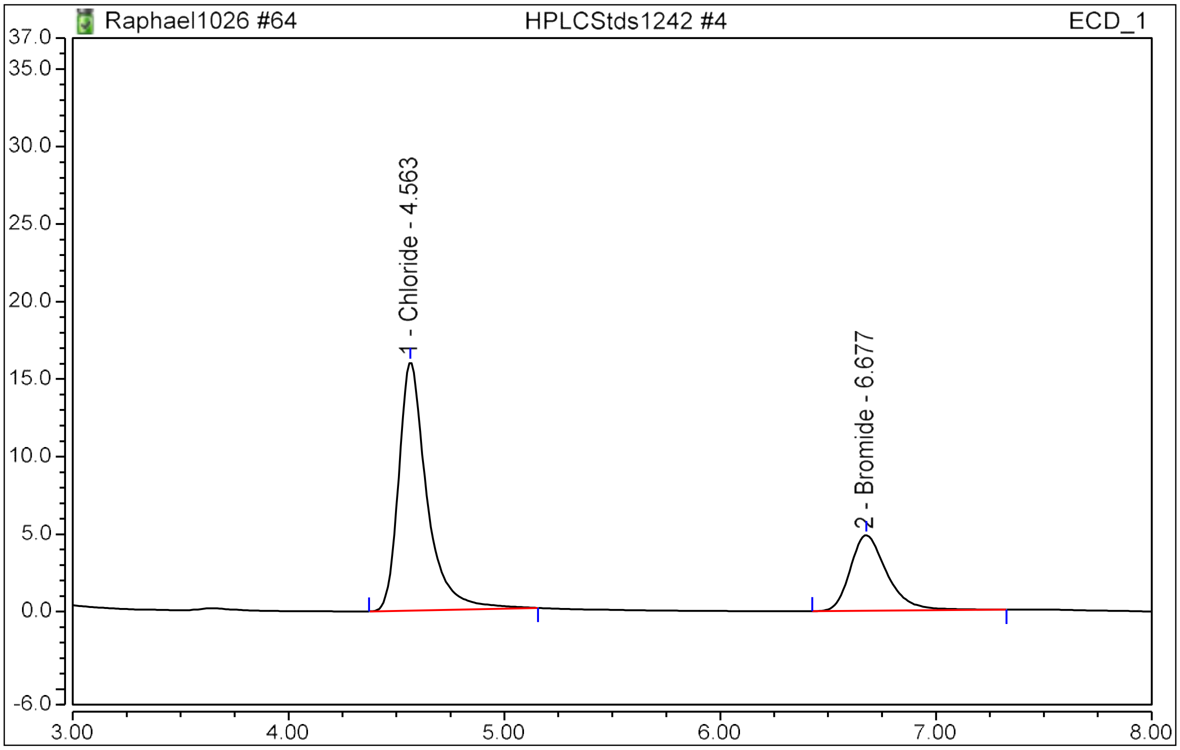
Sample Name:	**1221-086.AltAudit-E050-1140-2.NaOH**	Injection Volume:	**25.00**
Injection Type:	**Unknown**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 21:46**	Run Time:	**28.00**



Analyst Comment: Report both

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	3.324	22.143	20.10732	FALSE	FALSE
2	6.68	Bromide	0.186	0.957	3.12453	FALSE	FALSE

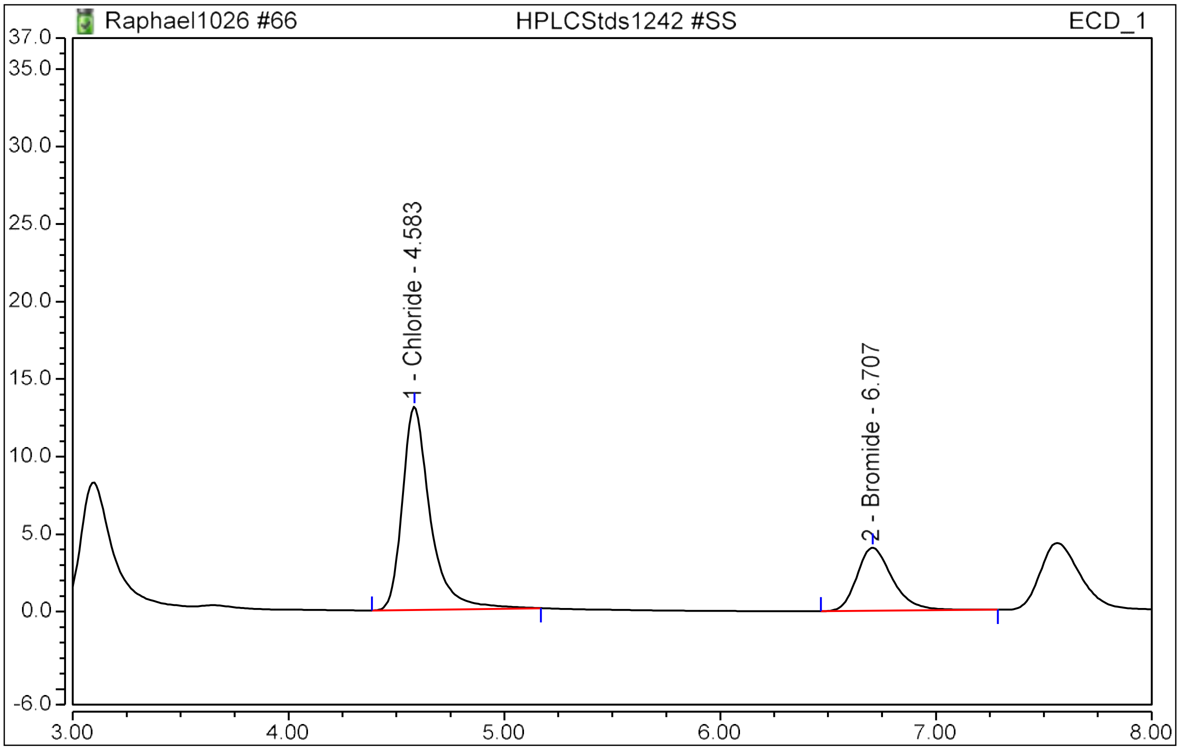
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 22:16**	Run Time:	**28.00**



Analyst Comment: Report sing. inj.

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.430	16.039	15.21007	FALSE	FALSE
2	6.68	Bromide	0.966	4.881	14.99123	FALSE	FALSE

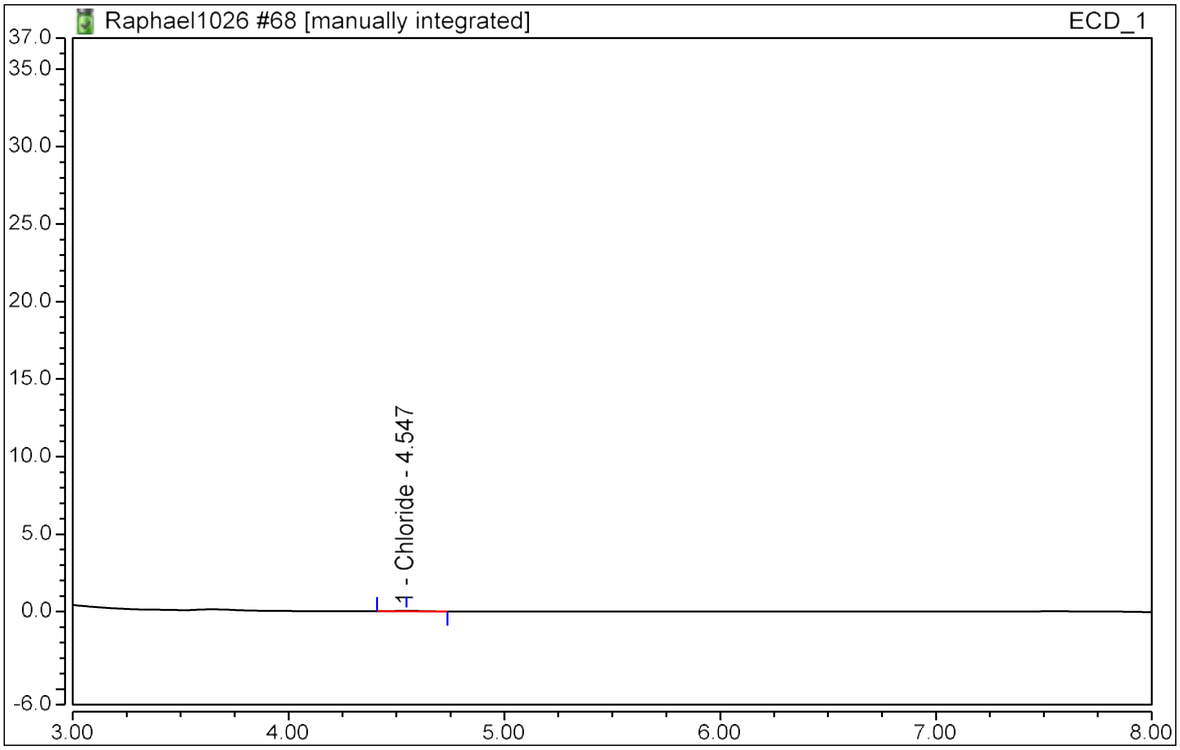
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 23:15**	Run Time:	**28.00**



Analyst Comment: Report sing. inj.

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	1.968	13.120	12.53831	FALSE	FALSE
2	6.71	Bromide	0.785	4.086	12.42735	FALSE	FALSE

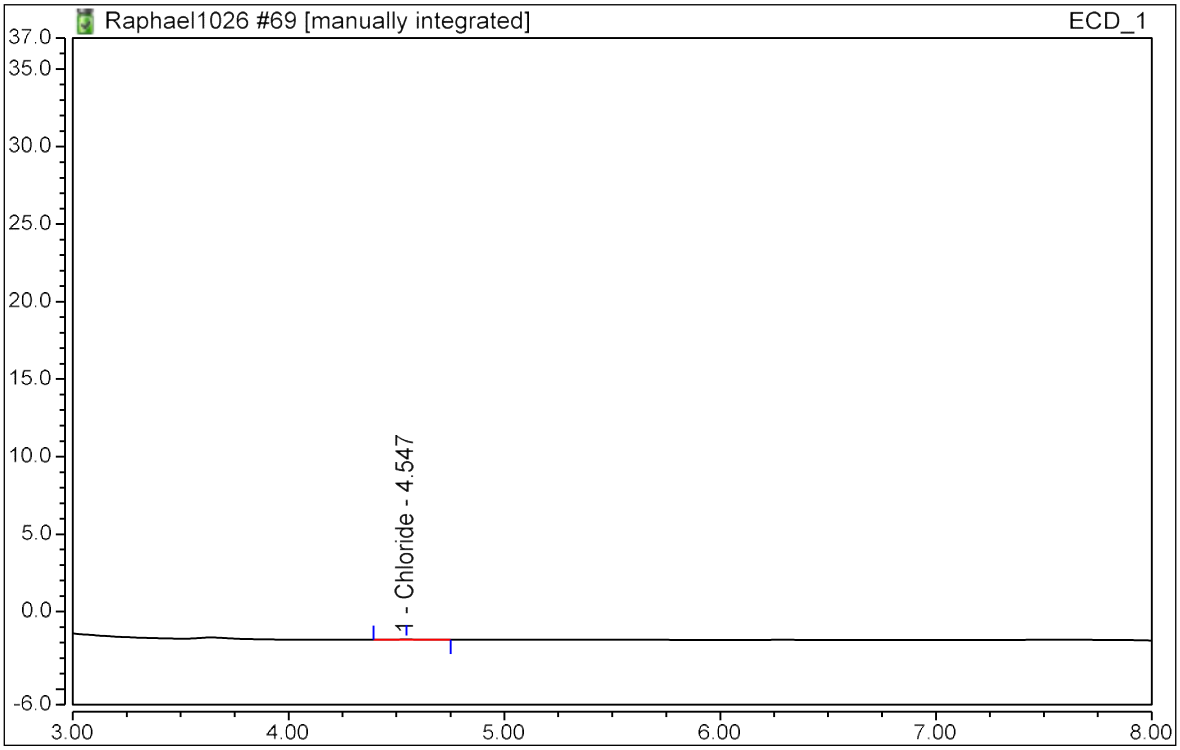
Sample Name:	**HPLCStds1242 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 00:14**	Run Time:	**28.00**



Analyst Comment: WP PRM 1/4/22

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.004	0.037	0.12643	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Sample Name:	**HPLCStds1242 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 00:44**	Run Time:	**28.00**



Analyst Comment: NI PRM 1/4/22

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.005	0.037	0.12715	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

Calibration Table

No.	Injection Name	Inject Time	Pos.	Level	Ref.Amount	Calibration Point Status	Amount	Cal Point Status	Dil.Factor	Volume
					µg/mL		µg/mL			
					ECD_1	ECD_1	ECD_1	ECD_1		
					Chloride	Chloride	Bromide	Bromide		
4	HPLCStds1242 #6	28/Dec/2021 16:35	BA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
5	HPLCStds1242 #6	28/Dec/2021 17:04	BA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
6	HPLCStds1242 #5	28/Dec/2021 17:34	BA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
7	HPLCStds1242 #5	28/Dec/2021 18:04	BA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
8	HPLCStds1242 #4	28/Dec/2021 18:33	BA4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
9	HPLCStds1242 #4	28/Dec/2021 19:03	BA4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
10	HPLCStds1242 #3	28/Dec/2021 19:33	BA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
11	HPLCStds1242 #3	28/Dec/2021 20:03	BA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
12	HPLCStds1242 #2	28/Dec/2021 20:32	BA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
13	HPLCStds1242 #2	28/Dec/2021 21:02	BA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
14	HPLCStds1242 #1	28/Dec/2021 21:32	BA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
15	HPLCStds1242 #1	28/Dec/2021 22:01	BA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
72	HPLCStds1242 #6	30/Dec/2021 02:13	BA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
73	HPLCStds1242 #6	30/Dec/2021 02:43	BA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
74	HPLCStds1242 #5	30/Dec/2021 03:12	BA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
75	HPLCStds1242 #5	30/Dec/2021 03:42	BA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
76	HPLCStds1242 #4	30/Dec/2021 04:12	BA4	04	15.0000	Disabled	15.0000	Disabled	1.0000	25.00
77	HPLCStds1242 #4	30/Dec/2021 04:41	BA4	04	15.0000	Disabled	15.0000	Disabled	1.0000	25.00
78	HPLCStds1242 #3	30/Dec/2021 05:11	BA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
79	HPLCStds1242 #3	30/Dec/2021 05:41	BA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
80	HPLCStds1242 #2	30/Dec/2021 06:10	BA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
81	HPLCStds1242 #2	30/Dec/2021 06:40	BA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
82	HPLCStds1242 #1	30/Dec/2021 07:10	BA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
83	HPLCStds1242 #1	30/Dec/2021 07:39	BA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
86	HPLCStds1242 #4	30/Dec/2021 12:40	BB4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
87	HPLCStds1242 #4	30/Dec/2021 13:09	BB4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00

Detection Parameters

Ret. Time min	Param. Name	Param. Value	Inj. Type	Channel
Always	Baseline Noise Auto Range	Off	Any	All Channels
Always	Baseline Noise Start Time	0.400 [min]	Any	All Channels
Always	Baseline Noise End Time	0.700 [min]	Any	All Channels
Always	Cobra Smoothing Width	Auto	Any	All Channels
Always	Consider Void Peak	Off	Any	All Channels
0.000	Maximum Rider Ratio	10 [%]	Any	All Channels
0.000	Tailing Sensitivity Factor	0.500 [%]	Any	All Channels
0.000	Inhibit Integration	On	Any	All Channels
0.000	Minimum Area	Auto	Any	All Channels
4.250	Inhibit Integration	Off	Any	All Channels
7.331	Inhibit Integration	On	Any	All Channels

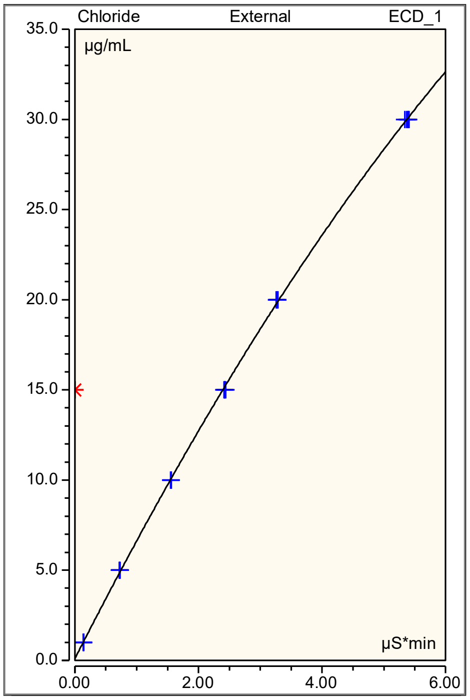
Calibration Batch Report

Sequence:	**Raphael1026**	*Injection Volume:*	**25.00**
Instrument Method:	**AS22 ASAP Base**	*Operator:*	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 22:16**	*Run Time:*	**28**

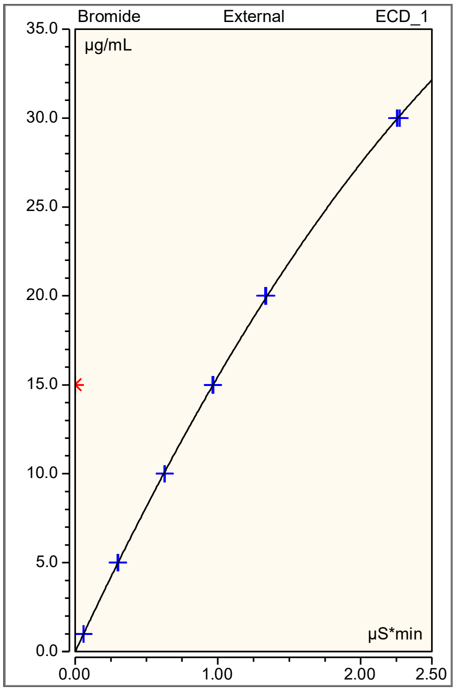
Calibration Summary

Peak Name	Eval.Type	Cal.Type	Points	Offset (C0)	Slope (C1)	Curve (C2)	Coeff.Det. %
Chloride	Area	Quad, WithOffset, 1/A	24.000	0.096	6.758	-0.222	99.985
Bromide	Area	Quad, WithOffset, 1/A	24.000	-0.026	17.226	-1.743	99.994
		AVERAGE:		0.0354	11.9922	-0.9827	99.9897

Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Chloride	Chloride	Chloride	Chloride
HPLCStds1242 #6	4.567	5.393	36.062	30.084
HPLCStds1242 #6	4.570	5.335	35.568	29.832
HPLCStds1242 #5	4.563	3.282	21.496	19.884
HPLCStds1242 #5	4.563	3.261	21.306	19.772
HPLCStds1242 #4	4.560	2.421	15.602	15.158
HPLCStds1242 #4	4.557	2.440	15.643	15.264
HPLCStds1242 #3	4.557	1.556	9.852	10.075
HPLCStds1242 #3	4.553	1.558	9.862	10.086
HPLCStds1242 #2	4.550	0.721	4.535	4.853
HPLCStds1242 #2	4.550	0.730	4.569	4.914
HPLCStds1242 #1	4.547	0.136	0.874	1.014
HPLCStds1242 #1	4.547	0.134	0.860	1.000
HPLCStds1242 #6	4.580	5.374	36.397	30.001
HPLCStds1242 #6	4.580	5.404	36.649	30.131
HPLCStds1242 #5	4.573	3.265	21.881	19.795
HPLCStds1242 #5	4.570	3.282	22.047	19.884
HPLCStds1242 #4	n.a.	n.a.	n.a.	n.a.
HPLCStds1242 #4	n.a.	n.a.	n.a.	n.a.
HPLCStds1242 #3	4.560	1.551	10.072	10.046
HPLCStds1242 #3	4.563	1.561	10.148	10.102
HPLCStds1242 #2	4.560	0.728	4.713	4.898
HPLCStds1242 #2	4.560	0.720	4.695	4.847
HPLCStds1242 #1	4.550	0.137	0.902	1.019
HPLCStds1242 #1	4.557	0.137	0.899	1.017
HPLCStds1242 #4	4.563	2.409	16.025	15.091
HPLCStds1242 #4	4.563	2.429	16.156	15.199



Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Bromide	Bromide	Bromide	Bromide
HPLCStds1242 #6	6.660	2.275	10.829	30.143
HPLCStds1242 #6	6.663	2.253	10.693	29.937
HPLCStds1242 #5	6.670	1.341	6.392	19.937
HPLCStds1242 #5	6.667	1.331	6.340	19.808
HPLCStds1242 #4	6.667	0.964	4.591	14.966
HPLCStds1242 #4	6.667	0.969	4.601	15.034
HPLCStds1242 #3	6.670	0.626	2.984	10.068
HPLCStds1242 #3	6.667	0.626	2.991	10.077
HPLCStds1242 #2	6.667	0.296	1.447	4.925
HPLCStds1242 #2	6.670	0.303	1.458	5.028
HPLCStds1242 #1	6.667	0.060	0.291	0.997
HPLCStds1242 #1	6.667	0.059	0.288	0.985
HPLCStds1242 #6	6.680	2.260	11.511	29.999
HPLCStds1242 #6	6.680	2.273	11.559	30.127
HPLCStds1242 #5	6.680	1.329	6.784	19.793
HPLCStds1242 #5	6.680	1.338	6.809	19.900
HPLCStds1242 #4	n.a.	n.a.	n.a.	n.a.
HPLCStds1242 #4	n.a.	n.a.	n.a.	n.a.
HPLCStds1242 #3	6.677	0.630	3.215	10.132
HPLCStds1242 #3	6.677	0.630	3.224	10.141
HPLCStds1242 #2	6.680	0.303	1.572	5.027
HPLCStds1242 #2	6.677	0.300	1.569	4.986
HPLCStds1242 #1	6.670	0.060	0.312	0.996
HPLCStds1242 #1	6.677	0.060	0.312	1.010
HPLCStds1242 #4	6.670	0.963	4.930	14.943
HPLCStds1242 #4	6.667	0.969	4.966	15.026



Calibration Table

No.	Injection Name	Inject Time	Pos.	Level	Ref.Amount	Calibration Point Status	Amount	Cal Point Status	Dil.Factor	Volume
					µg/mL ECD_1 Chloride	ECD_1 Chloride	µg/mL ECD_1 Bromide	ECD_1 Bromide		
2	HPLCStds1242 #6	04/Jan/2022 15:42	RA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
3	HPLCStds1242 #6	04/Jan/2022 16:12	RA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
4	HPLCStds1242 #5	04/Jan/2022 16:43	RA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
5	HPLCStds1242 #5	04/Jan/2022 17:14	RA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
6	HPLCStds1242 #4	04/Jan/2022 17:44	RA4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
7	HPLCStds1242 #4	04/Jan/2022 18:15	RA4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
8	HPLCStds1242 #3	04/Jan/2022 18:46	RA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
9	HPLCStds1242 #3	04/Jan/2022 19:16	RA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
10	HPLCStds1242 #2	04/Jan/2022 19:47	RA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
11	HPLCStds1242 #2	04/Jan/2022 20:18	RA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
12	HPLCStds1242 #1	04/Jan/2022 20:48	RA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
13	HPLCStds1242 #1	04/Jan/2022 21:19	RA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
39	HPLCStds1242 #6	05/Jan/2022 10:37	RA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
40	HPLCStds1242 #6	05/Jan/2022 11:07	RA6	06	30.0000	Ok	30.0000	Ok	1.0000	25.00
41	HPLCStds1242 #5	05/Jan/2022 11:38	RA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
42	HPLCStds1242 #5	05/Jan/2022 12:09	RA5	05	20.0000	Ok	20.0000	Ok	1.0000	25.00
43	HPLCStds1242 #4	05/Jan/2022 12:39	RA4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
44	HPLCStds1242 #4	05/Jan/2022 13:10	RA4	04	15.0000	Ok	15.0000	Ok	1.0000	25.00
45	HPLCStds1242 #3	05/Jan/2022 14:05	RA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
46	HPLCStds1242 #3	05/Jan/2022 14:35	RA3	03	10.0000	Ok	10.0000	Ok	1.0000	25.00
47	HPLCStds1242 #2	05/Jan/2022 15:06	RA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
48	HPLCStds1242 #2	05/Jan/2022 15:37	RA2	02	5.0000	Ok	5.0000	Ok	1.0000	25.00
49	HPLCStds1242 #1	05/Jan/2022 16:07	RA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00
50	HPLCStds1242 #1	05/Jan/2022 16:38	RA1	01	1.0000	Ok	1.0000	Ok	1.0000	25.00

Detection Parameters

Ret. Time min	Param. Name	Param. Value	Inj. Type	Channel
Always	Baseline Noise Auto Range	Off	Any	All Channels
Always	Baseline Noise Start Time	0.400 [min]	Any	All Channels
Always	Baseline Noise End Time	0.700 [min]	Any	All Channels
Always	Cobra Smoothing Width	Auto	Any	All Channels
Always	Consider Void Peak	Off	Any	All Channels
0.000	Maximum Rider Ratio	10 [%]	Any	All Channels
0.000	Tailing Sensitivity Factor	0.500 [%]	Any	All Channels
0.000	Inhibit Integration	On	Any	All Channels
0.000	Minimum Area	Auto	Any	All Channels
4.250	Inhibit Integration	Off	Any	All Channels
5.000	Inhibit Integration	On	Any	All Channels
6.400	Inhibit Integration	Off	Any	All Channels
7.331	Inhibit Integration	On	Any	All Channels

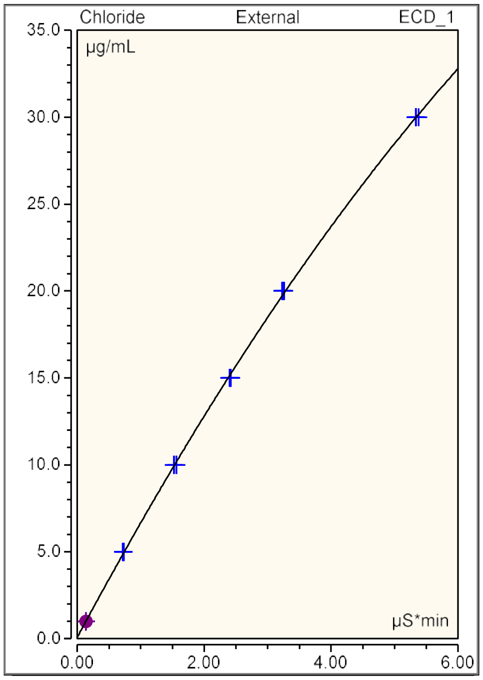
Calibration Batch Report

Sequence:	**Raphael1031**	*Injection Volume:*	**25.00**
Instrument Method:	**AS22 ASAP Base**	*Operator:*	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 16:38**	*Run Time:*	**29**

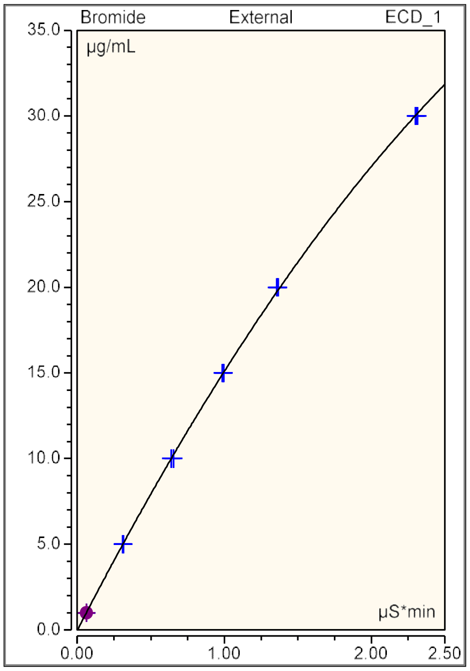
Calibration Summary

Peak Name	**Eval.Type**	**Cal.Type**	**Points**	**Offset (C0)**	**Slope (C1)**	**Curve (C2)**	**Coeff.Det. %**
Chloride	Area	Quad, WithOffset, 1/A	24.000	0.069	6.823	-0.228	99.984
Bromide	Area	Quad, WithOffset, 1/A	24.000	-0.016	16.688	-1.577	99.989
		AVERAGE:		0.0264	11.7555	-0.9023	99.9865

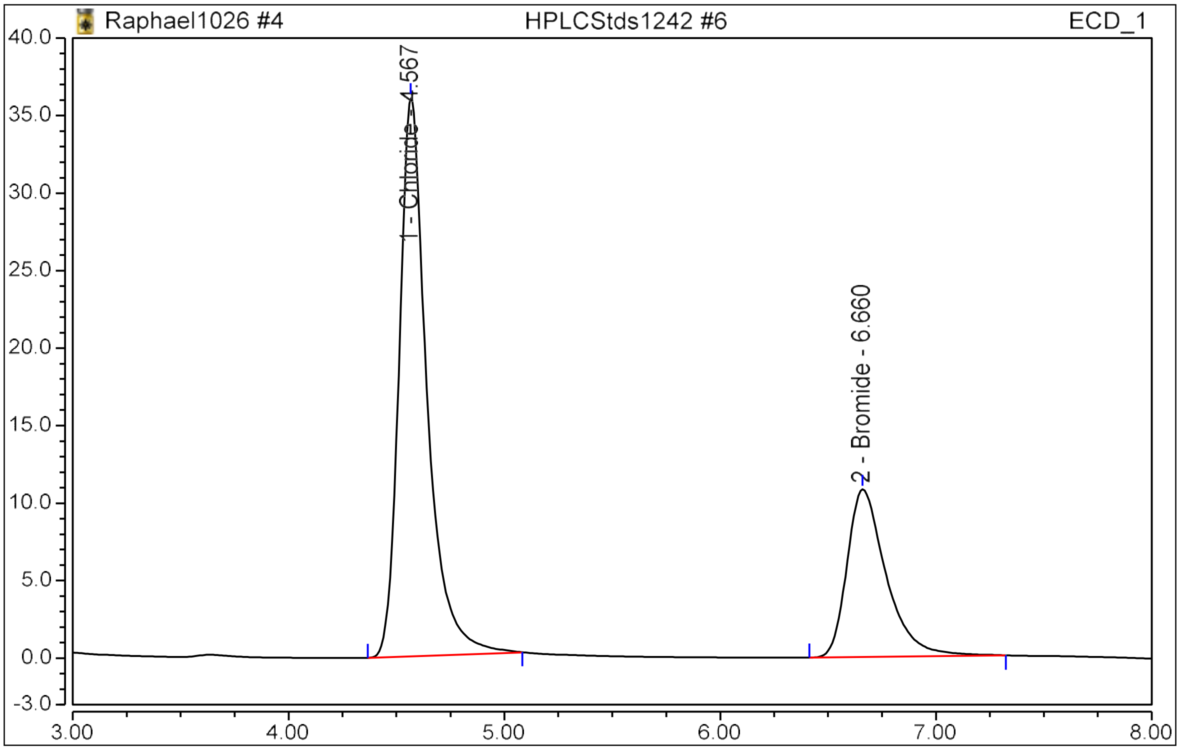
Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Chloride	Chloride	Chloride	Chloride
HPLCStds1242 #6	4.573	5.377	36.250	30.164
HPLCStds1242 #6	4.573	5.334	35.906	29.977
HPLCStds1242 #5	4.567	3.229	21.544	19.721
HPLCStds1242 #5	4.563	3.247	21.663	19.818
HPLCStds1242 #4	4.560	2.397	15.916	15.114
HPLCStds1242 #4	4.557	2.404	15.960	15.153
HPLCStds1242 #3	4.553	1.524	10.003	9.939
HPLCStds1242 #3	4.557	1.523	10.002	9.930
HPLCStds1242 #2	4.553	0.717	4.663	4.847
HPLCStds1242 #2	4.557	0.725	4.690	4.896
HPLCStds1242 #1	4.553	0.138	0.884	1.006
HPLCStds1242 #1	4.553	0.138	0.882	1.005
HPLCStds1242 #6	4.587	5.329	34.908	29.954
HPLCStds1242 #6	4.587	5.341	35.381	30.007
HPLCStds1242 #5	4.577	3.262	21.552	19.897
HPLCStds1242 #5	4.577	3.237	21.313	19.768
HPLCStds1242 #4	4.577	2.422	15.972	15.257
HPLCStds1242 #4	4.580	2.421	15.977	15.254
HPLCStds1242 #3	4.543	1.564	10.283	10.184
HPLCStds1242 #3	4.547	1.562	10.278	10.168
HPLCStds1242 #2	4.543	0.730	4.770	4.931
HPLCStds1242 #2	4.547	0.733	4.813	4.946
HPLCStds1242 #1	4.543	0.139	0.907	1.014
HPLCStds1242 #1	4.547	0.139	0.904	1.014



Injection Name	Ret.Time min ECD_1	Area µS*min ECD_1	Height µS ECD_1	Amount µg/mL ECD_1
	Bromide	Bromide	Bromide	Bromide
HPLCStds1242 #6	6.670	2.314	11.419	30.162
HPLCStds1242 #6	6.667	2.302	11.325	30.043
HPLCStds1242 #5	6.673	1.356	6.646	19.713
HPLCStds1242 #5	6.670	1.362	6.684	19.791
HPLCStds1242 #4	6.670	0.987	4.849	14.919
HPLCStds1242 #4	6.667	0.990	4.852	14.960
HPLCStds1242 #3	6.667	0.638	3.137	9.995
HPLCStds1242 #3	6.673	0.639	3.128	9.999
HPLCStds1242 #2	6.677	0.308	1.524	4.975
HPLCStds1242 #2	6.677	0.311	1.531	5.014
HPLCStds1242 #1	6.680	0.061	0.301	0.995
HPLCStds1242 #1	6.680	0.060	0.299	0.978
HPLCStds1242 #6	6.700	2.300	11.355	30.026
HPLCStds1242 #6	6.693	2.308	11.511	30.101
HPLCStds1242 #5	6.693	1.368	6.866	19.861
HPLCStds1242 #5	6.693	1.362	6.830	19.793
HPLCStds1242 #4	6.697	0.997	5.050	15.058
HPLCStds1242 #4	6.700	0.995	5.033	15.029
HPLCStds1242 #3	6.637	0.654	3.314	10.227
HPLCStds1242 #3	6.647	0.654	3.298	10.224
HPLCStds1242 #2	6.650	0.312	1.595	5.040
HPLCStds1242 #2	6.650	0.315	1.606	5.078
HPLCStds1242 #1	6.653	0.061	0.317	0.995
HPLCStds1242 #1	6.660	0.061	0.314	1.000



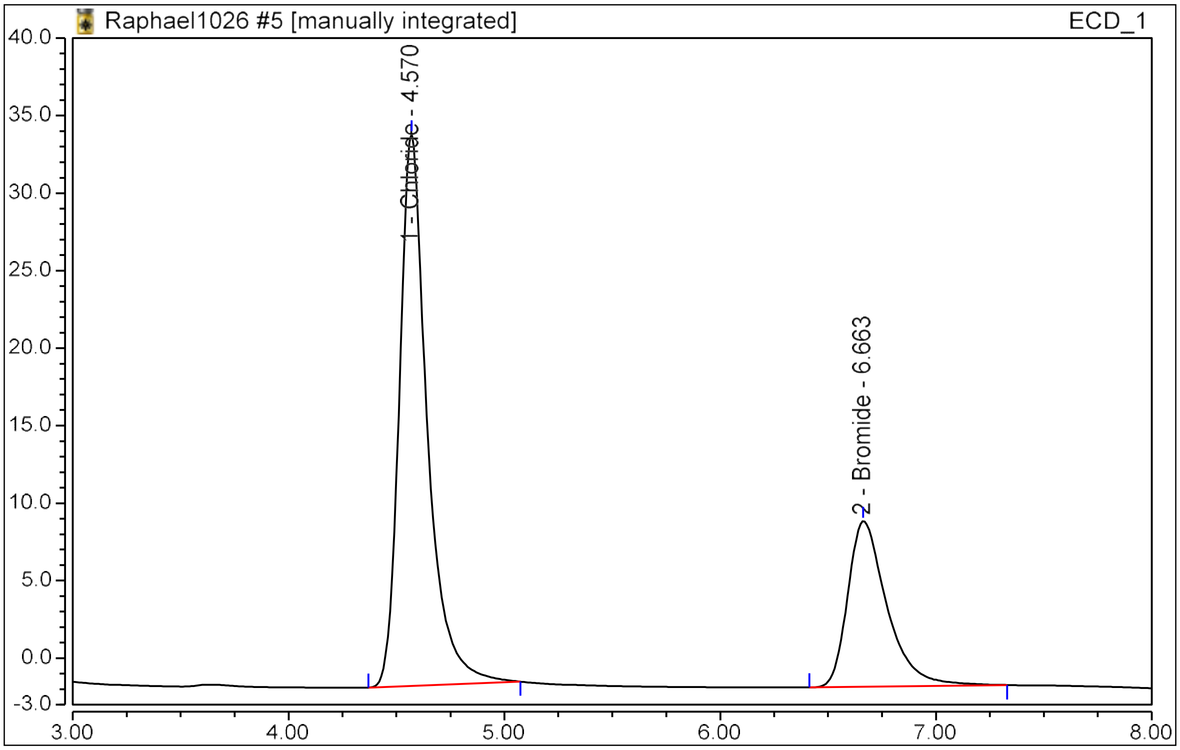
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 16:35**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	5.393	36.062	30.08429	FALSE	FALSE
2	6.66	Bromide	2.275	10.829	30.14303	FALSE	FALSE

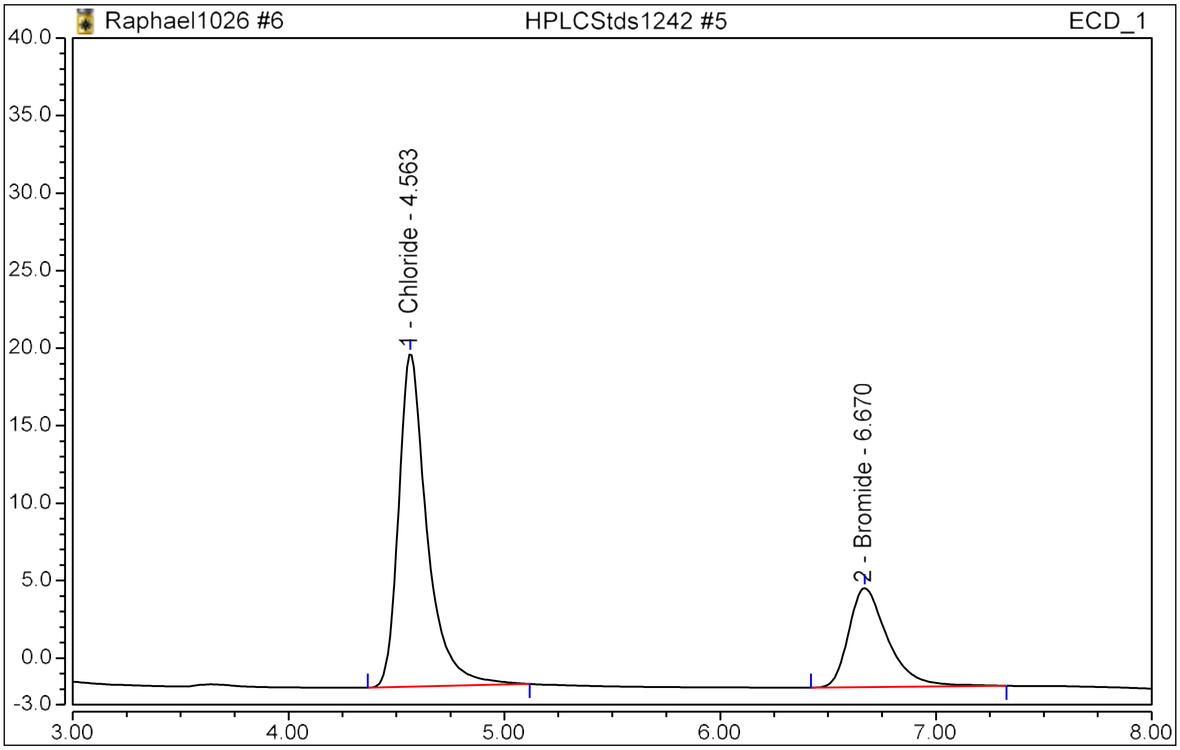
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 17:04**	Run Time:	**28.00**



Analyst Comment: II DLM 12/29/21

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	5.335	35.568	29.83231	FALSE	TRUE
2	6.66	Bromide	2.253	10.693	29.93716	FALSE	FALSE

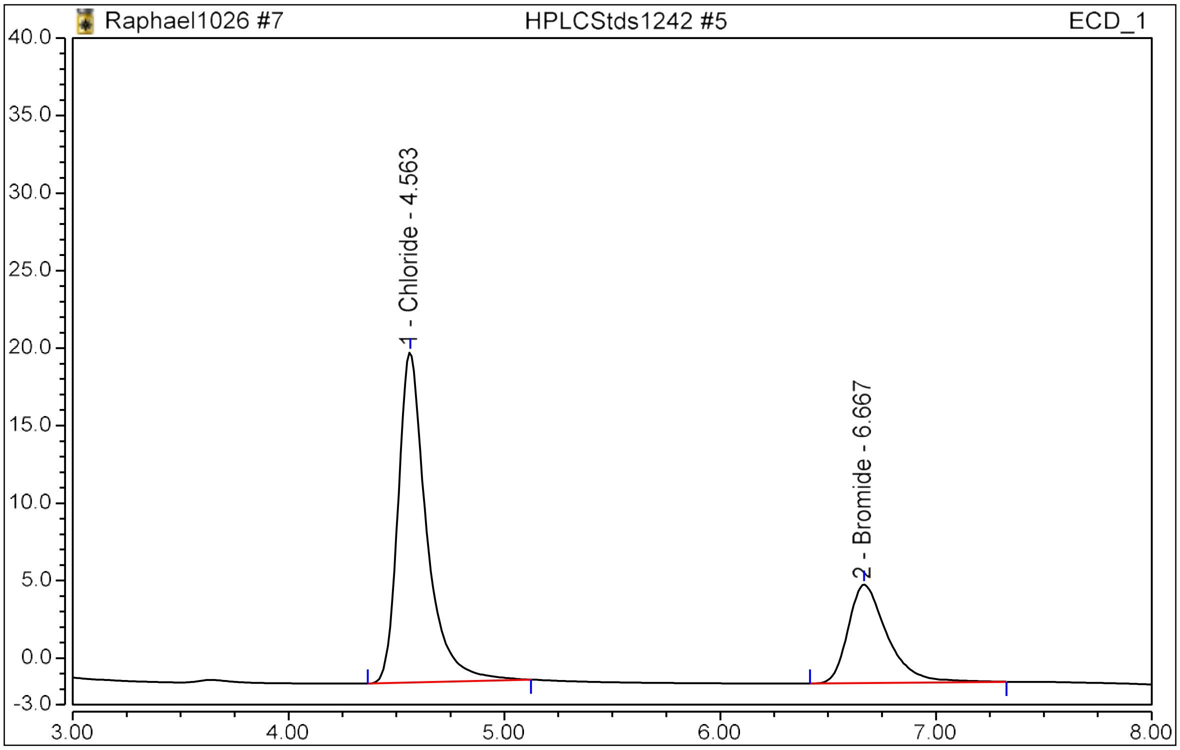
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 17:34**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	3.282	21.496	19.88415	FALSE	FALSE
2	6.67	Bromide	1.341	6.392	19.93699	FALSE	FALSE

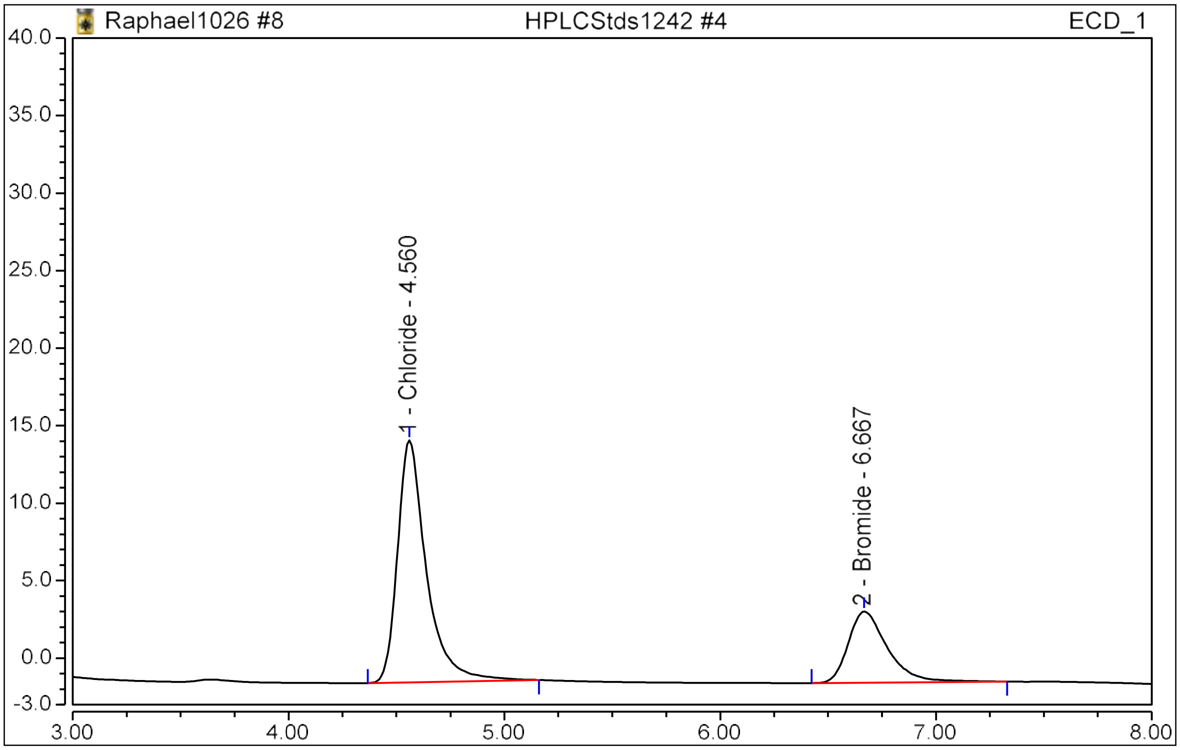
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 18:04**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	3.261	21.306	19.77176	FALSE	FALSE
2	6.67	Bromide	1.331	6.340	19.80788	FALSE	FALSE

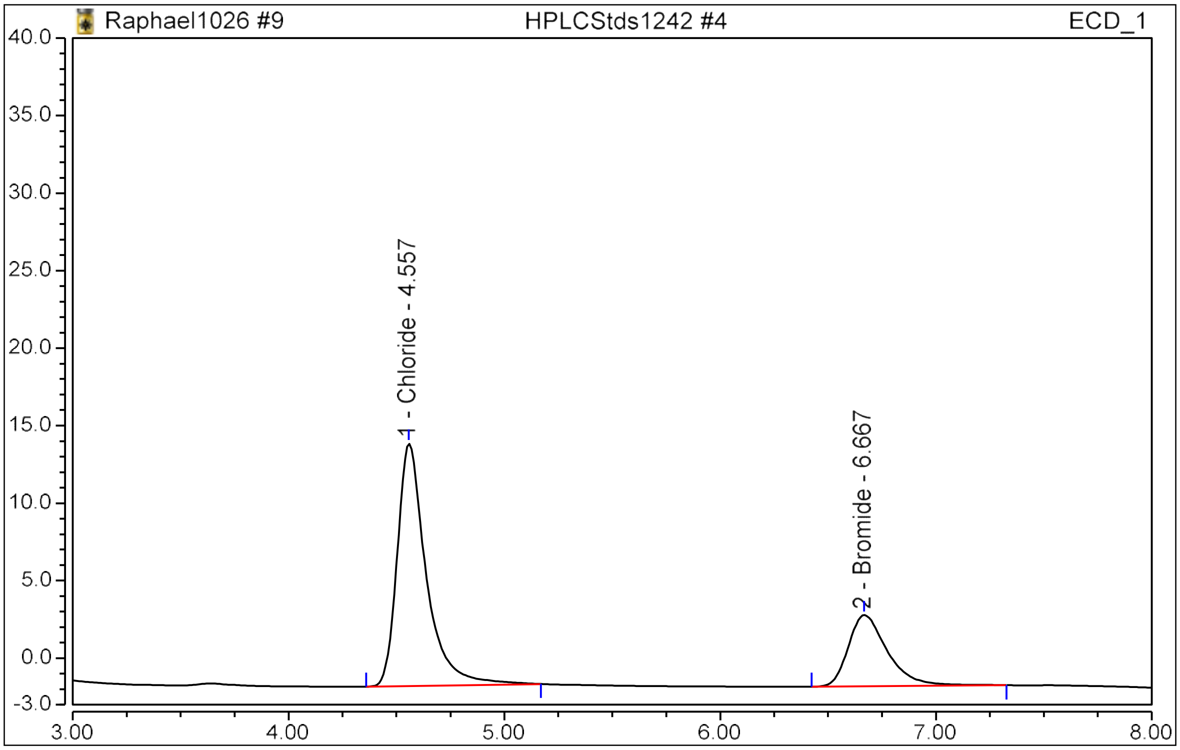
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 18:33**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.421	15.602	15.15818	FALSE	FALSE
2	6.67	Bromide	0.964	4.591	14.96643	FALSE	FALSE

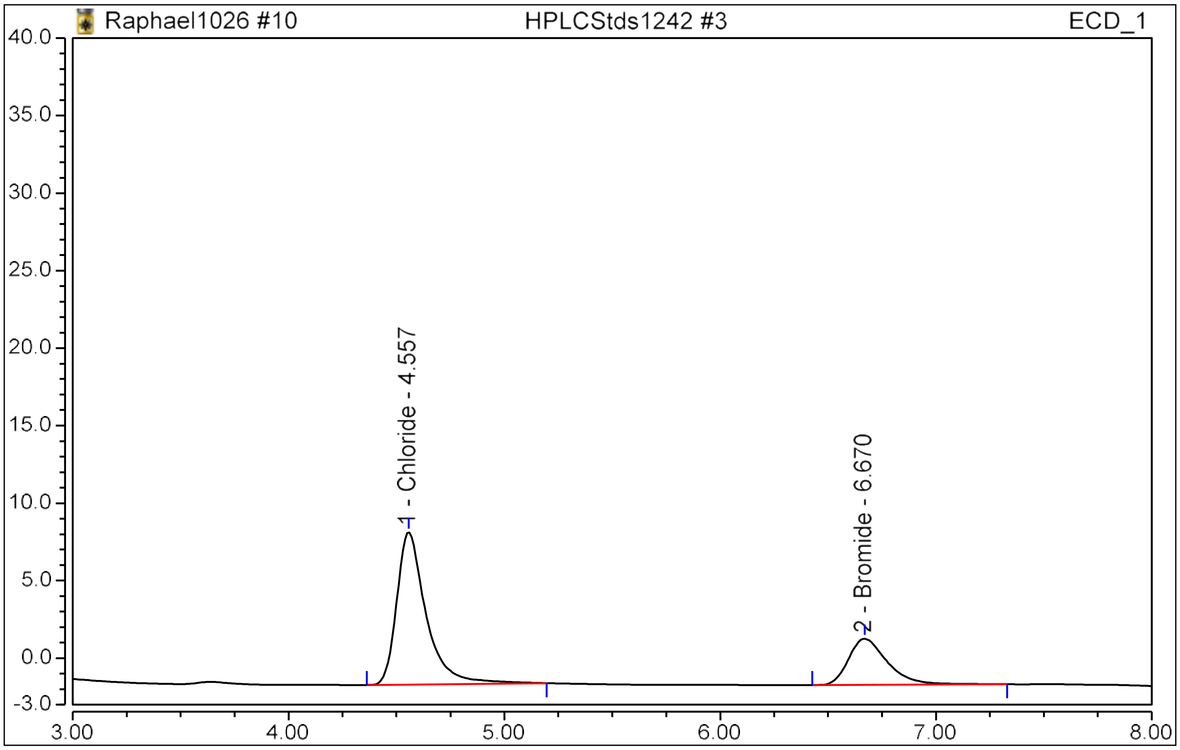
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 19:03**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.440	15.643	15.26384	FALSE	FALSE
2	6.67	Bromide	0.969	4.601	15.03438	FALSE	FALSE

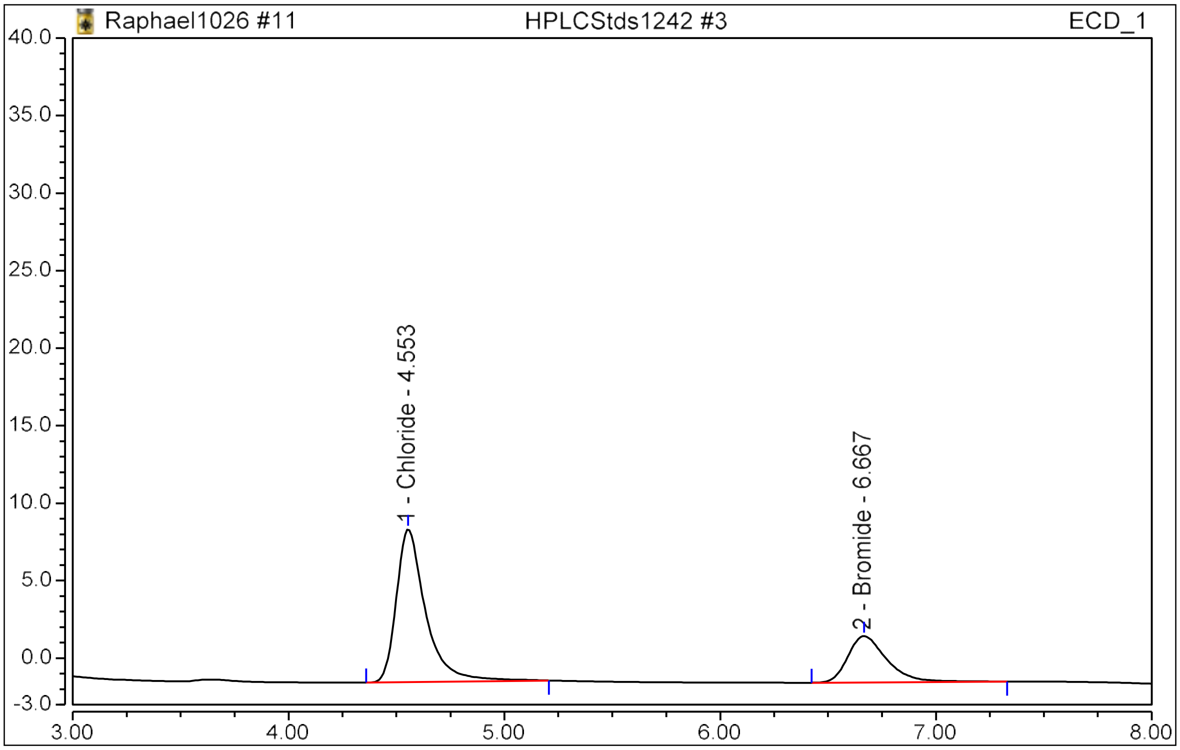
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 19:33**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	1.556	9.852	10.07461	FALSE	FALSE
2	6.67	Bromide	0.626	2.984	10.06803	FALSE	FALSE

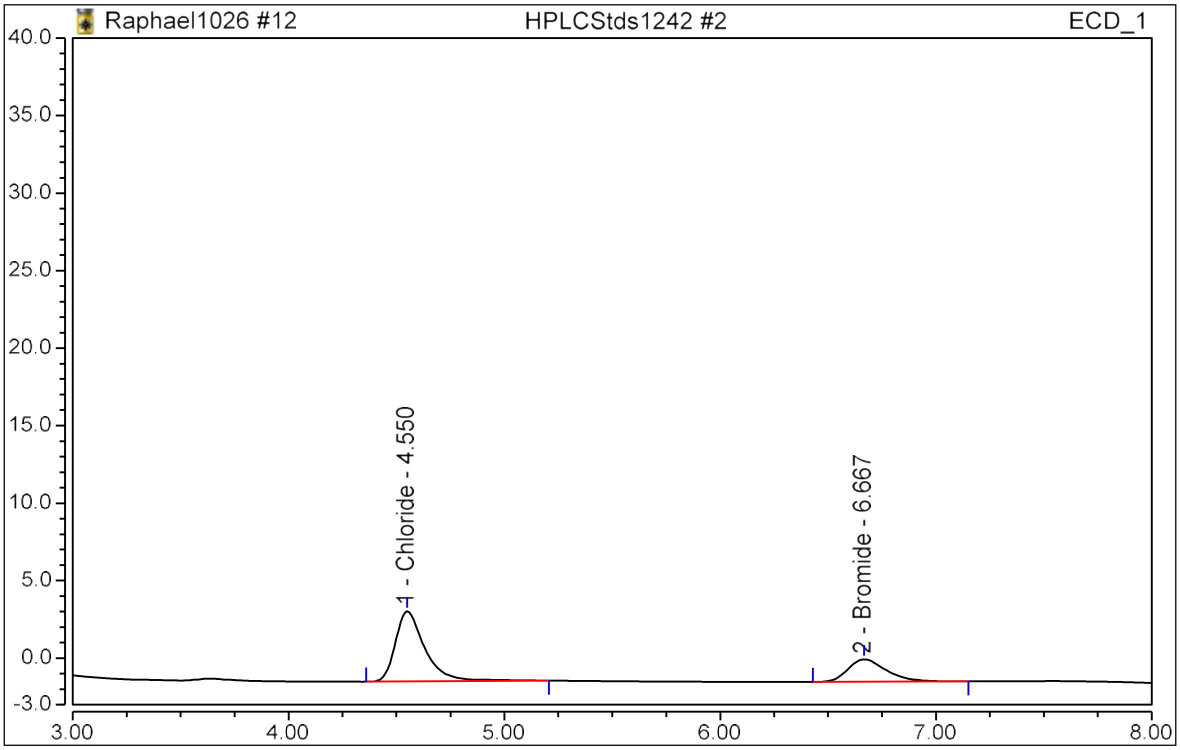
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 20:03**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	1.558	9.862	10.08590	FALSE	FALSE
2	6.67	Bromide	0.626	2.991	10.07710	FALSE	FALSE

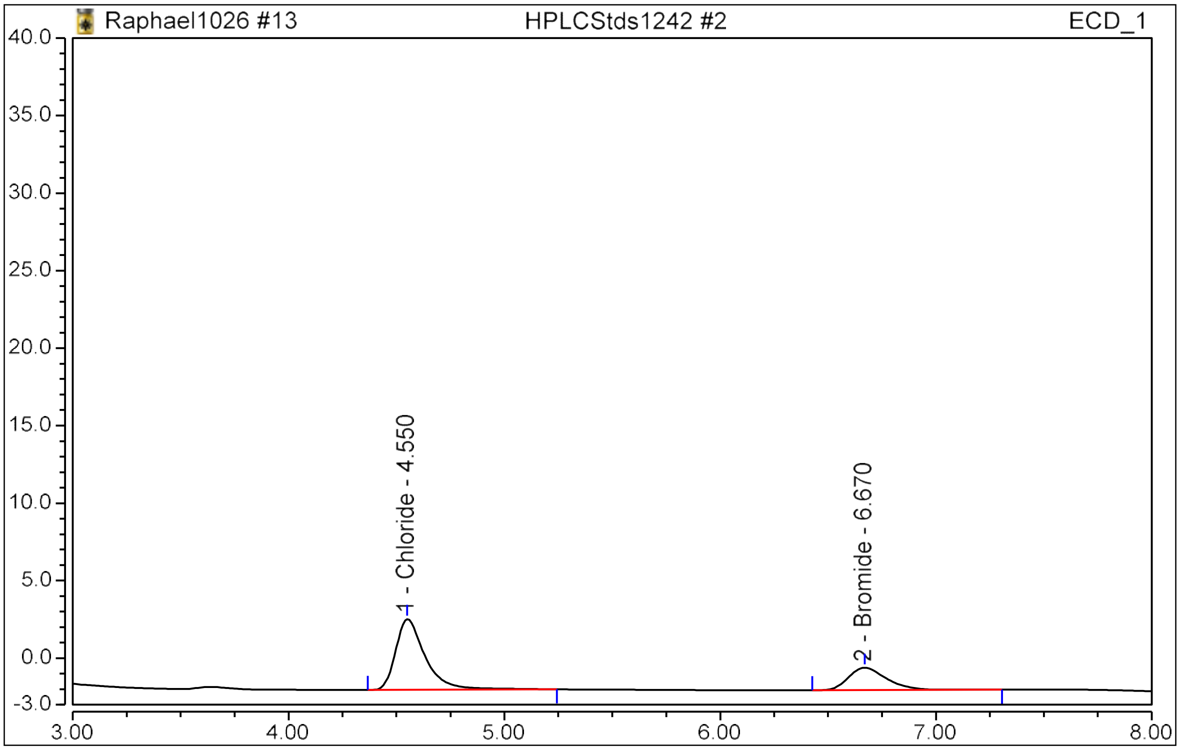
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 20:32**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.721	4.535	4.85337	FALSE	FALSE
2	6.67	Bromide	0.296	1.447	4.92491	FALSE	FALSE

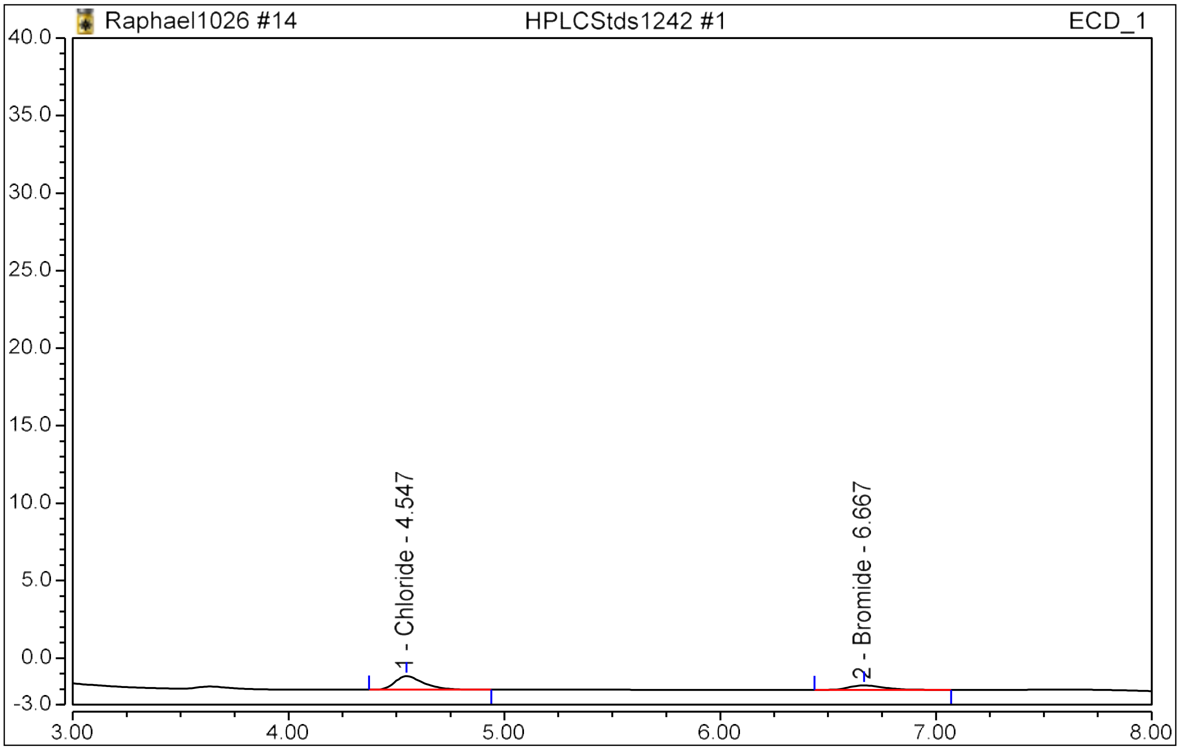
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 21:02**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.730	4.569	4.91415	FALSE	FALSE
2	6.67	Bromide	0.303	1.458	5.02832	FALSE	FALSE

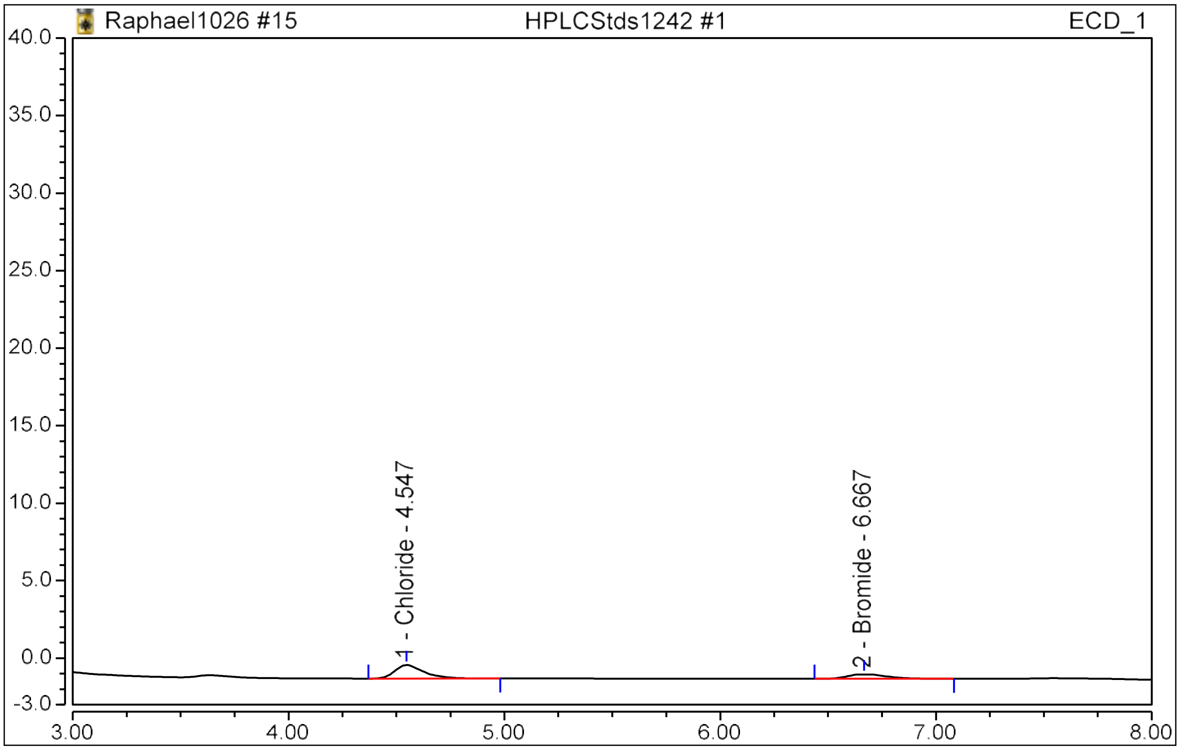
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 21:32**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.136	0.874	1.01448	FALSE	FALSE
2	6.67	Bromide	0.060	0.291	0.99727	FALSE	FALSE

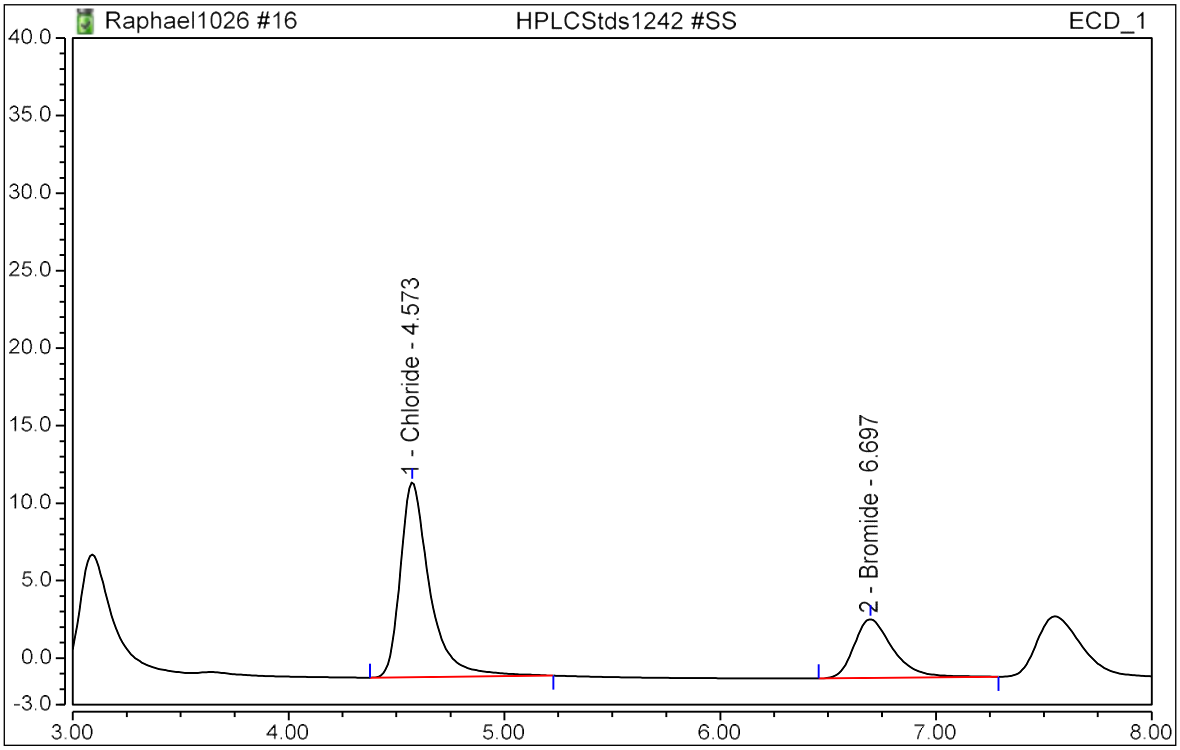
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 22:01**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.134	0.860	0.99996	FALSE	FALSE
2	6.67	Bromide	0.059	0.288	0.98500	FALSE	FALSE

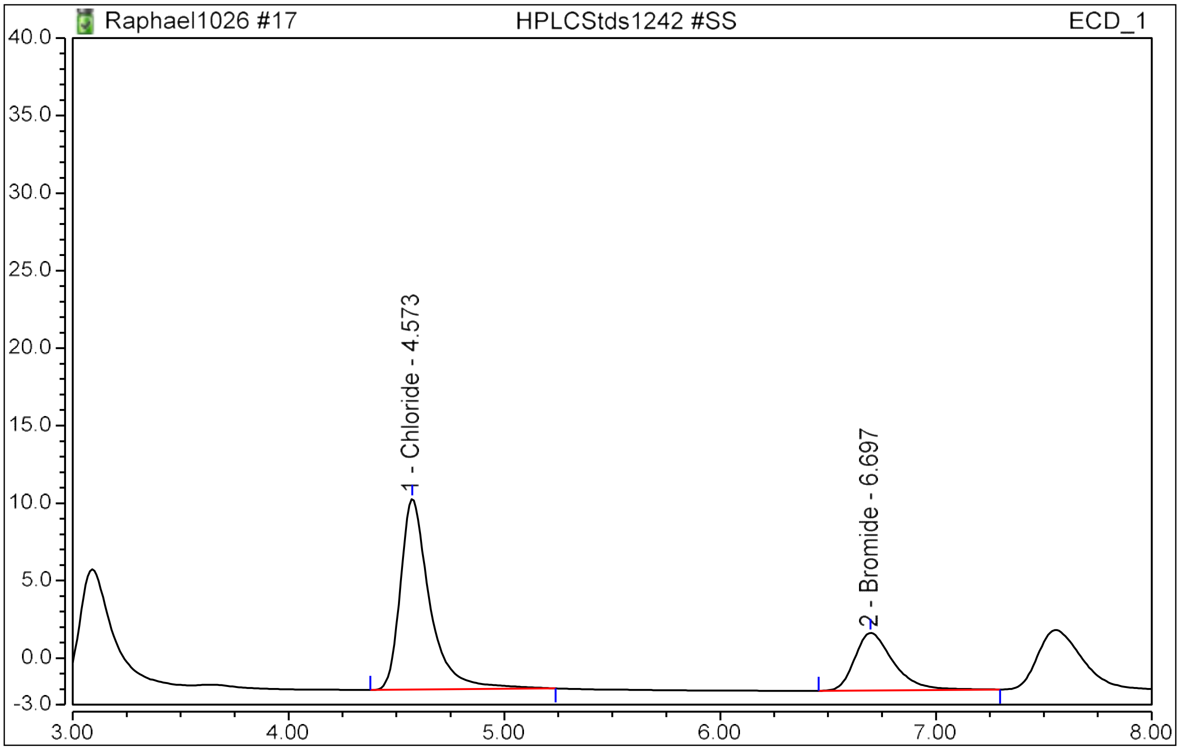
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 22:31**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	1.992	12.577	12.67698	FALSE	FALSE
2	6.70	Bromide	0.783	3.783	12.39836	FALSE	FALSE

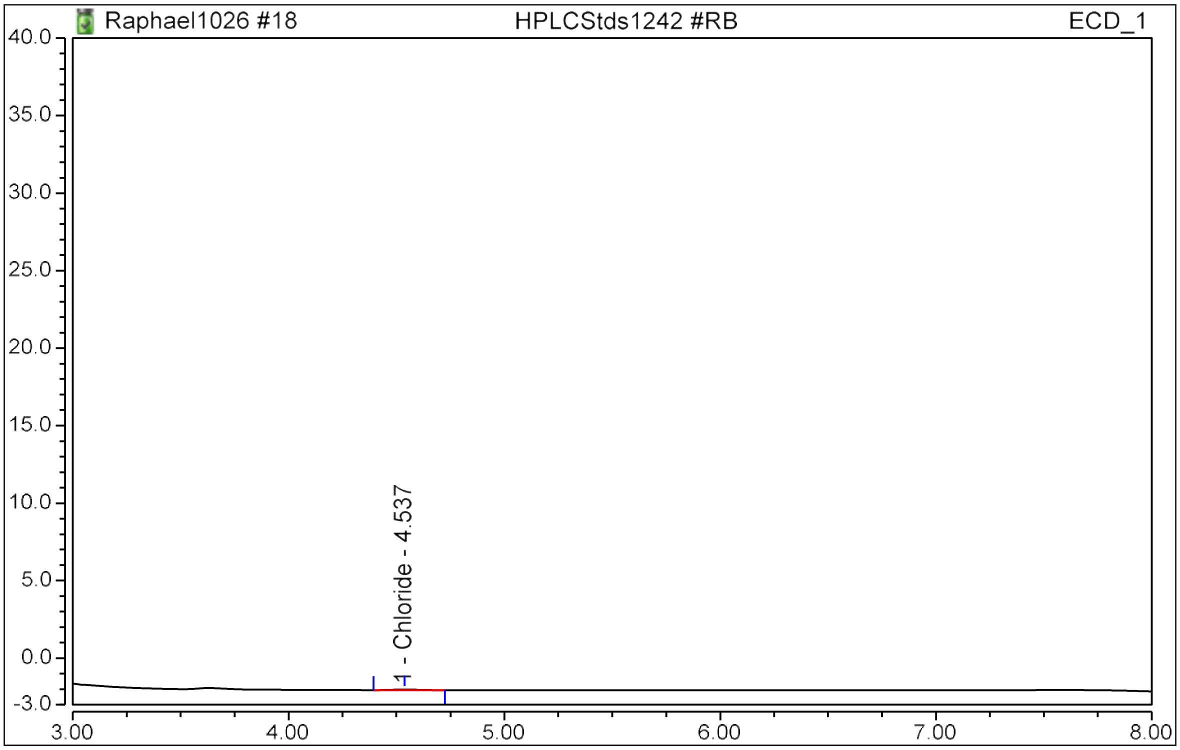
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 23:01**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	1.951	12.306	12.43710	FALSE	FALSE
2	6.70	Bromide	0.769	3.714	12.19582	FALSE	FALSE

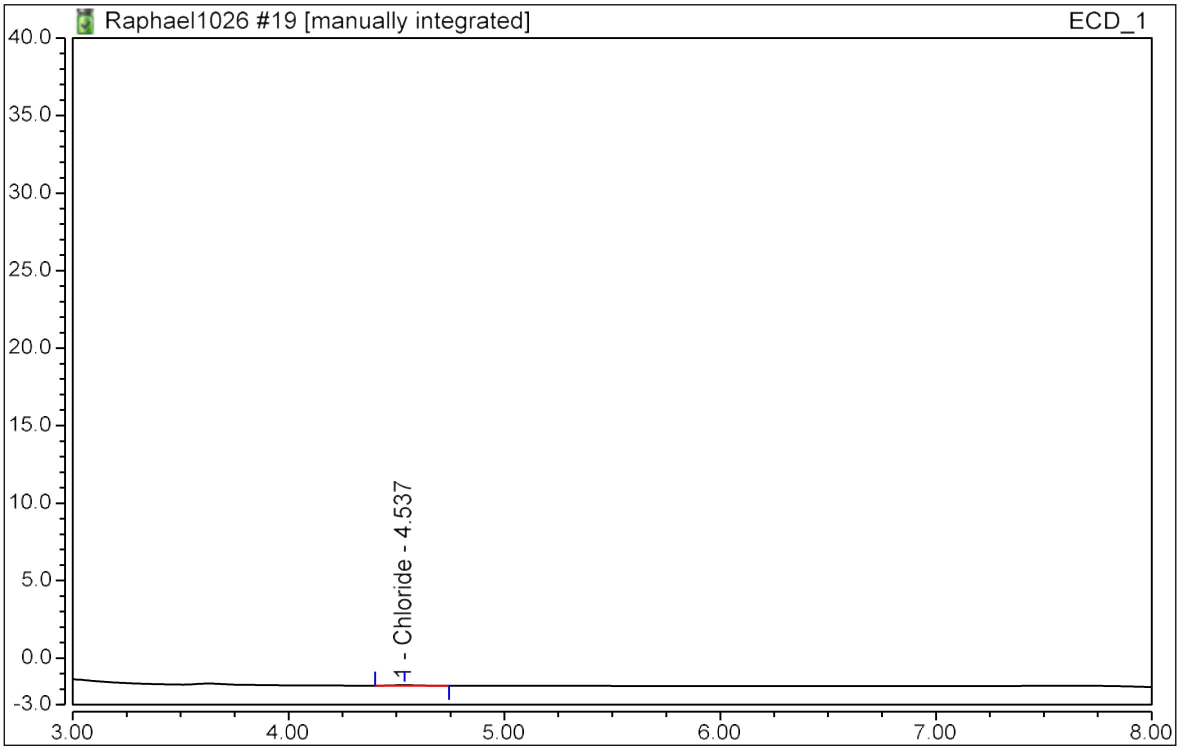
Sample Name:	**HPLCStds1242 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**28-Dec-2021 / 23:30**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	0.005	0.038	0.12958	FALSE	FALSE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

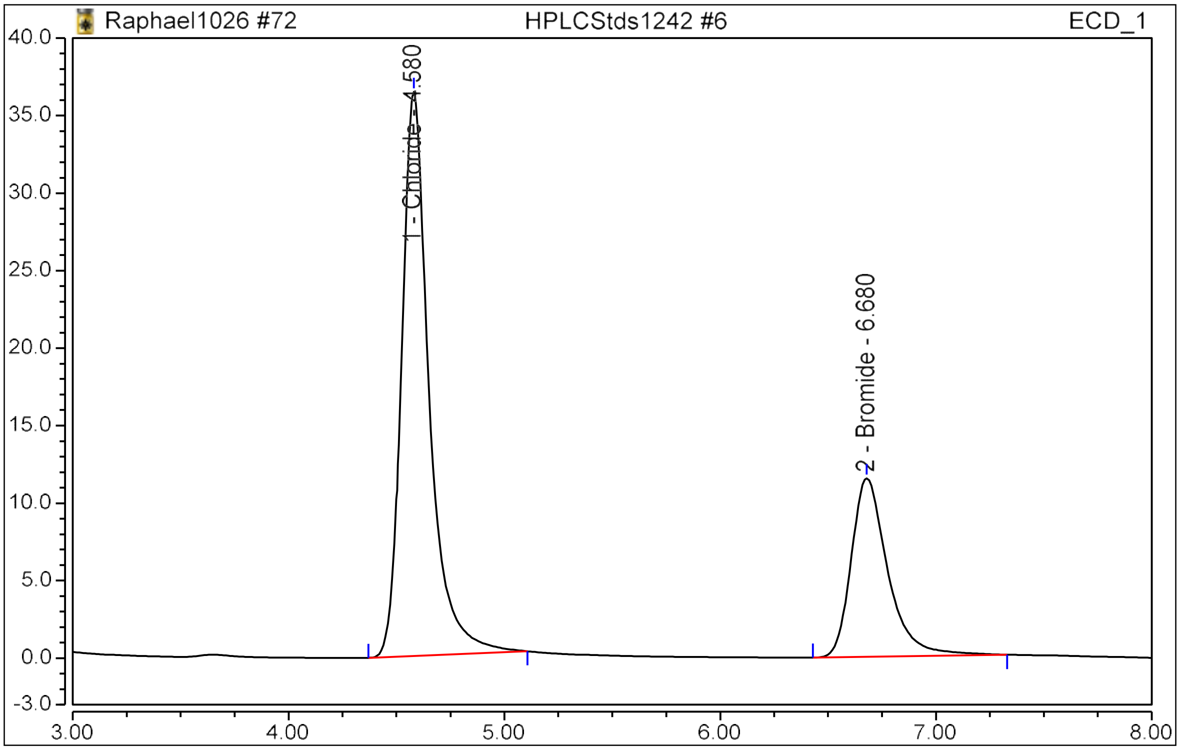
Sample Name:	**HPLCStds1242 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**29-Dec-2021 / 00:00**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	0.005	0.037	0.12908	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

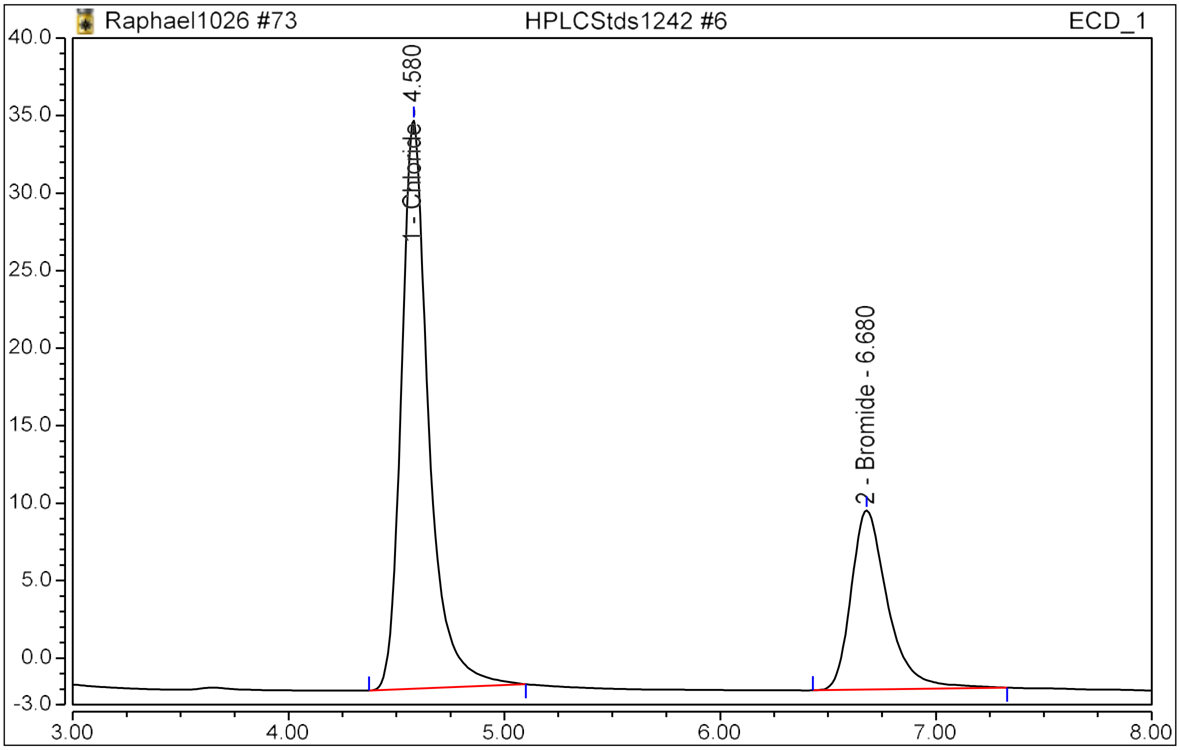
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 02:13**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	5.374	36.397	30.00097	FALSE	FALSE
2	6.68	Bromide	2.260	11.511	29.99854	FALSE	FALSE

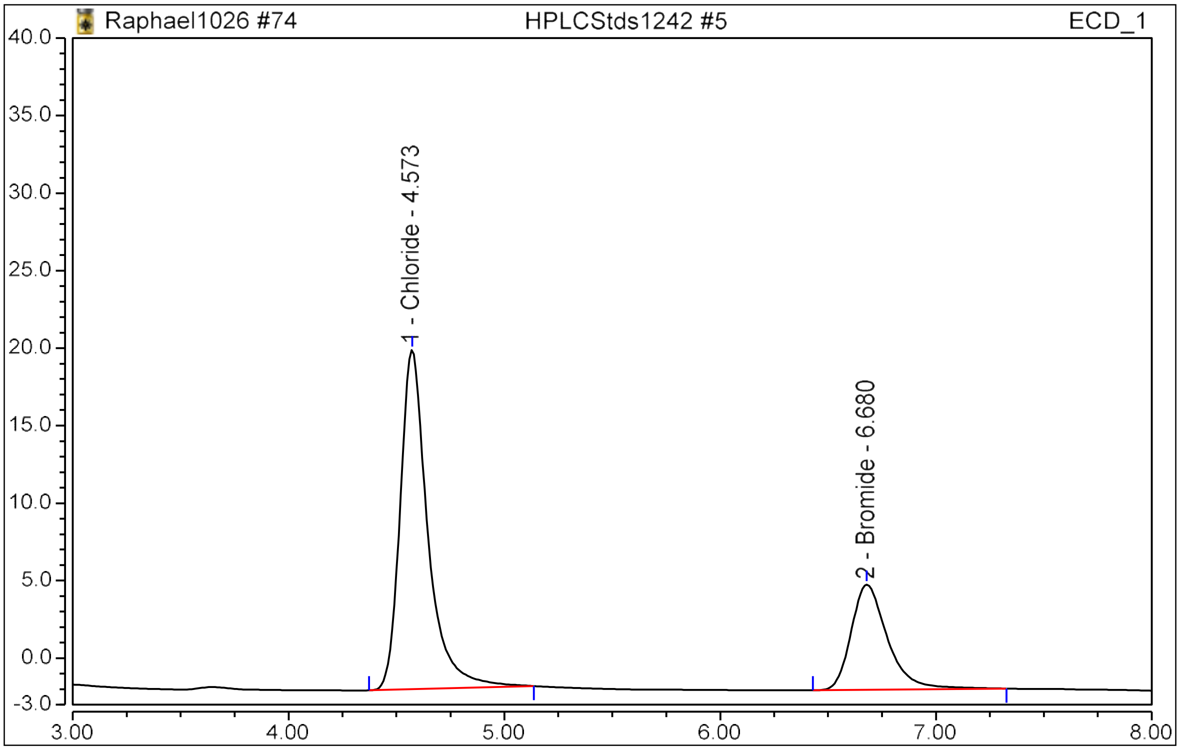
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 02:43**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	5.404	36.649	30.13072	FALSE	FALSE
2	6.68	Bromide	2.273	11.559	30.12745	FALSE	FALSE

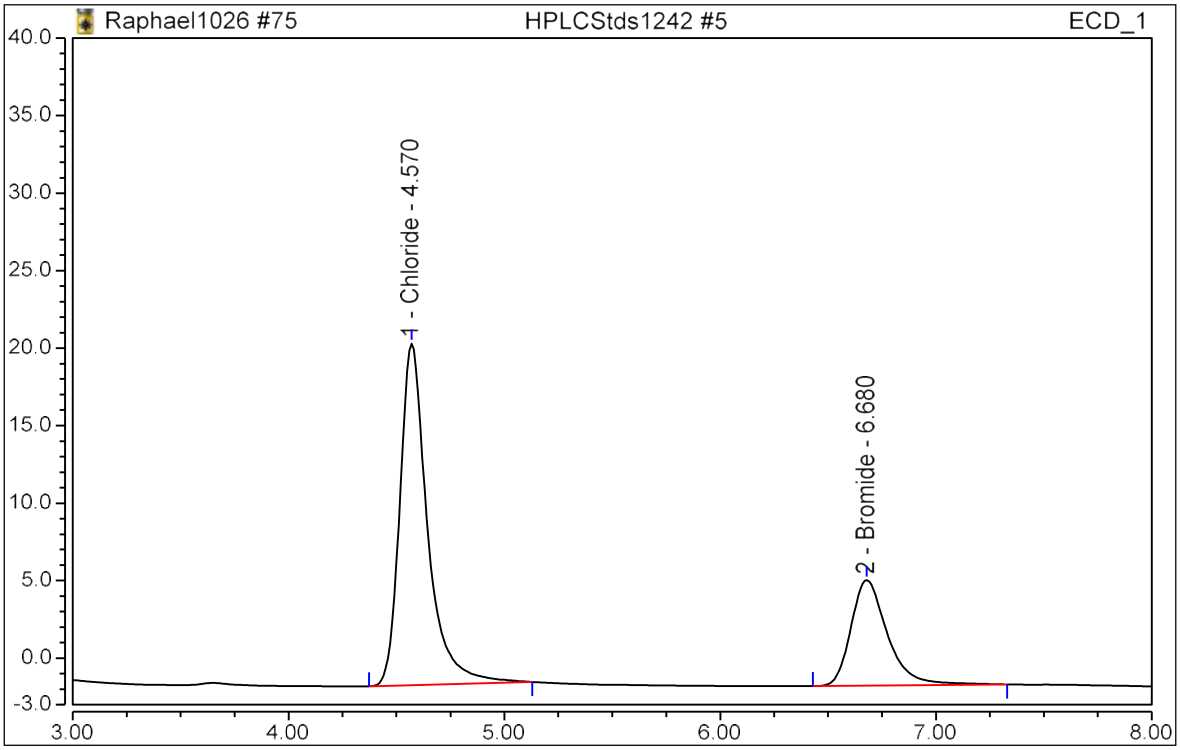
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 03:12**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	3.265	21.881	19.79534	FALSE	FALSE
2	6.68	Bromide	1.329	6.784	19.79320	FALSE	FALSE

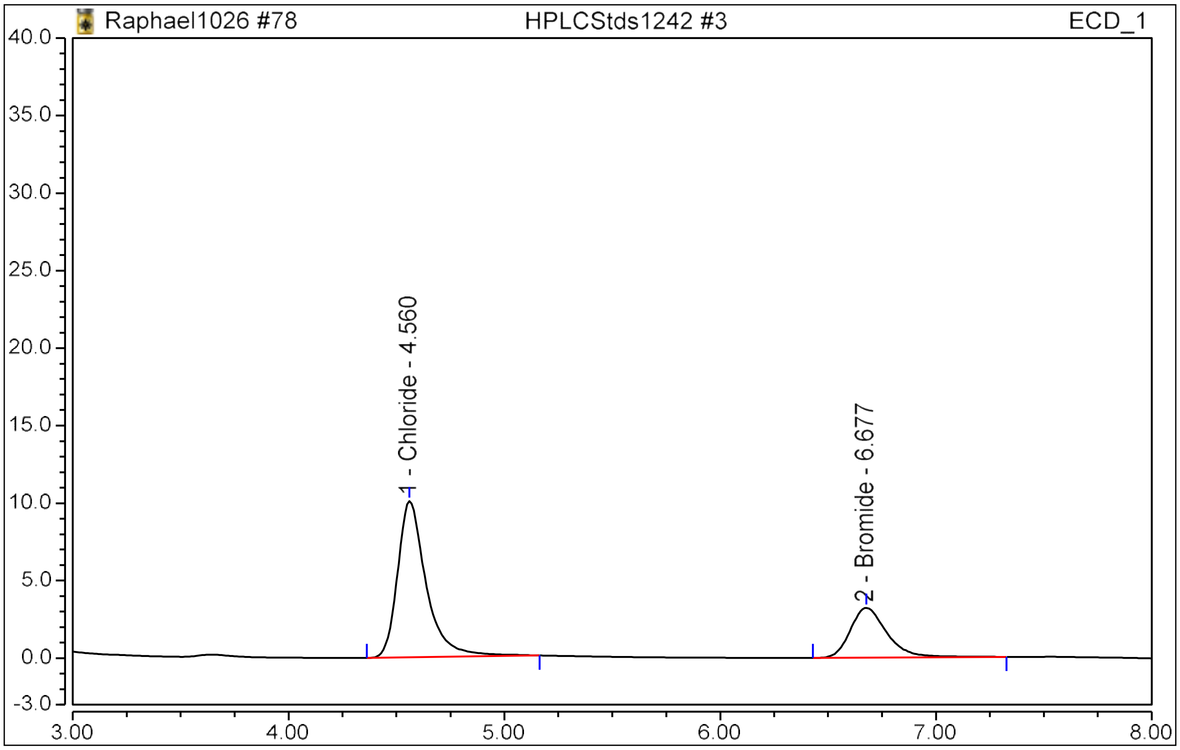
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 03:42**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	3.282	22.047	19.88405	FALSE	FALSE
2	6.68	Bromide	1.338	6.809	19.90024	FALSE	FALSE

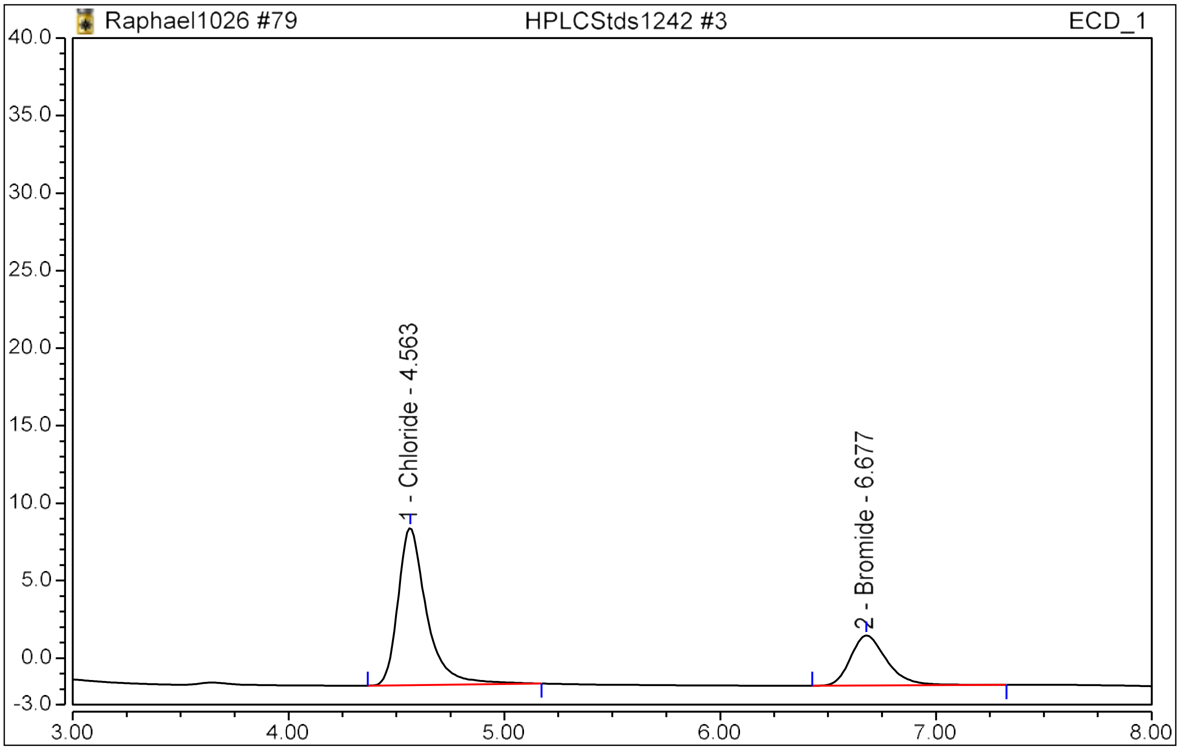
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 05:11**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	1.551	10.072	10.04571	FALSE	FALSE
2	6.68	Bromide	0.630	3.215	10.13201	FALSE	FALSE

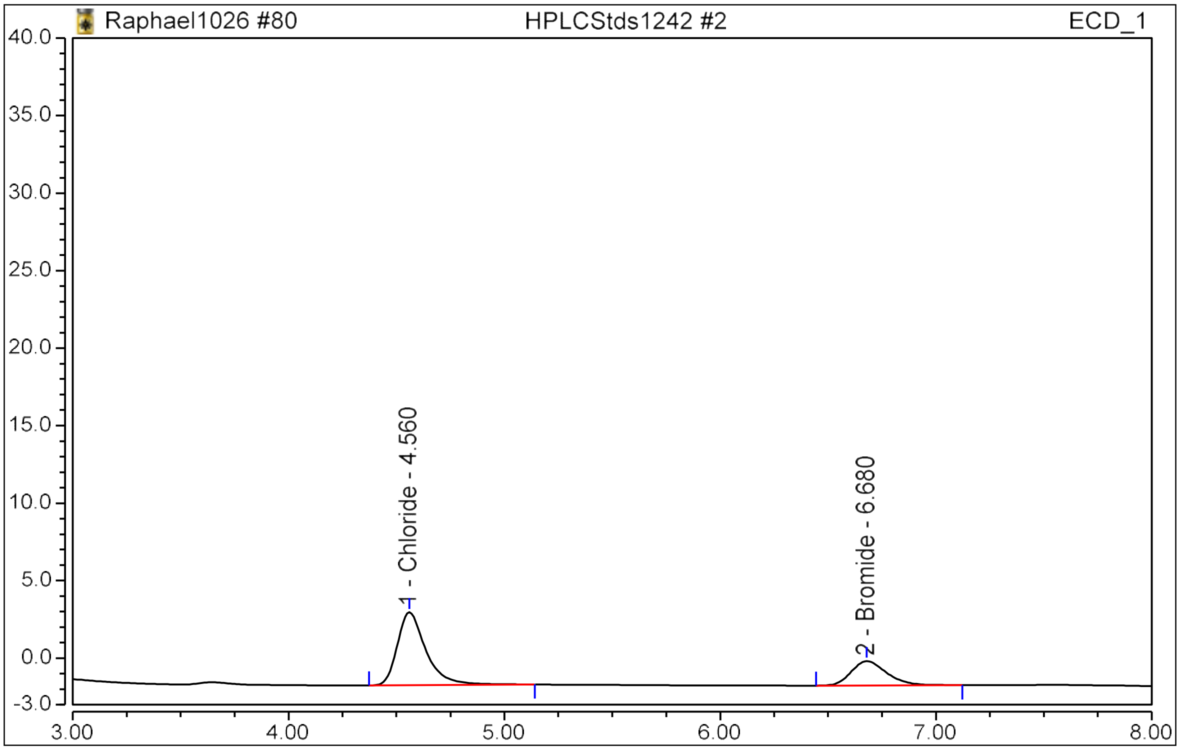
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 05:41**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	1.561	10.148	10.10183	FALSE	FALSE
2	6.68	Bromide	0.630	3.224	10.14090	FALSE	FALSE

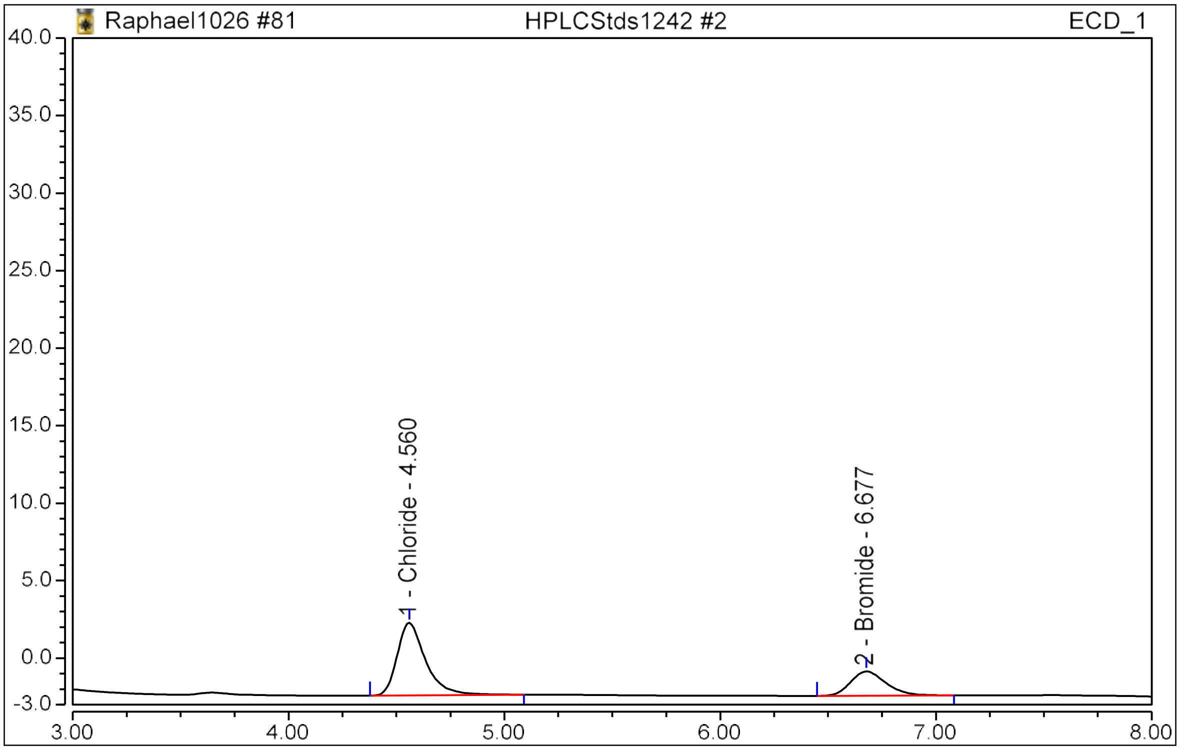
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 06:10**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	0.728	4.713	4.89763	FALSE	FALSE
2	6.68	Bromide	0.303	1.572	5.02732	FALSE	FALSE

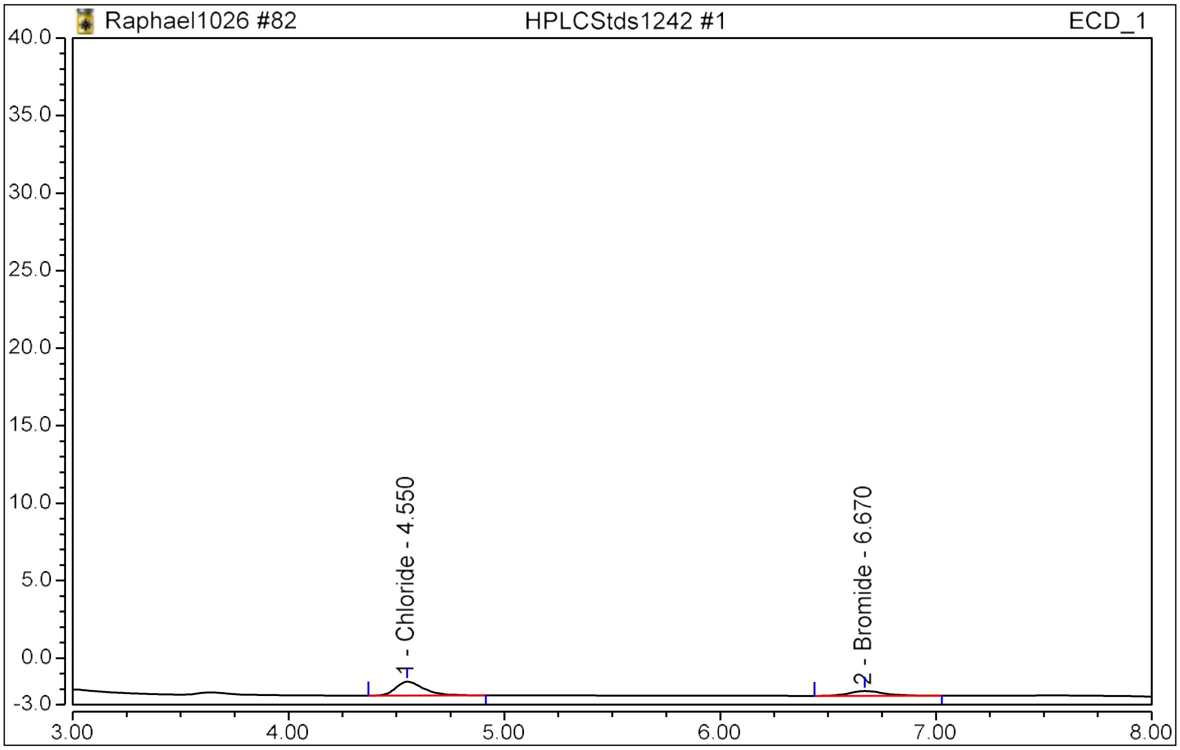
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 06:40**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	0.720	4.695	4.84729	FALSE	FALSE
2	6.68	Bromide	0.300	1.569	4.98573	FALSE	FALSE

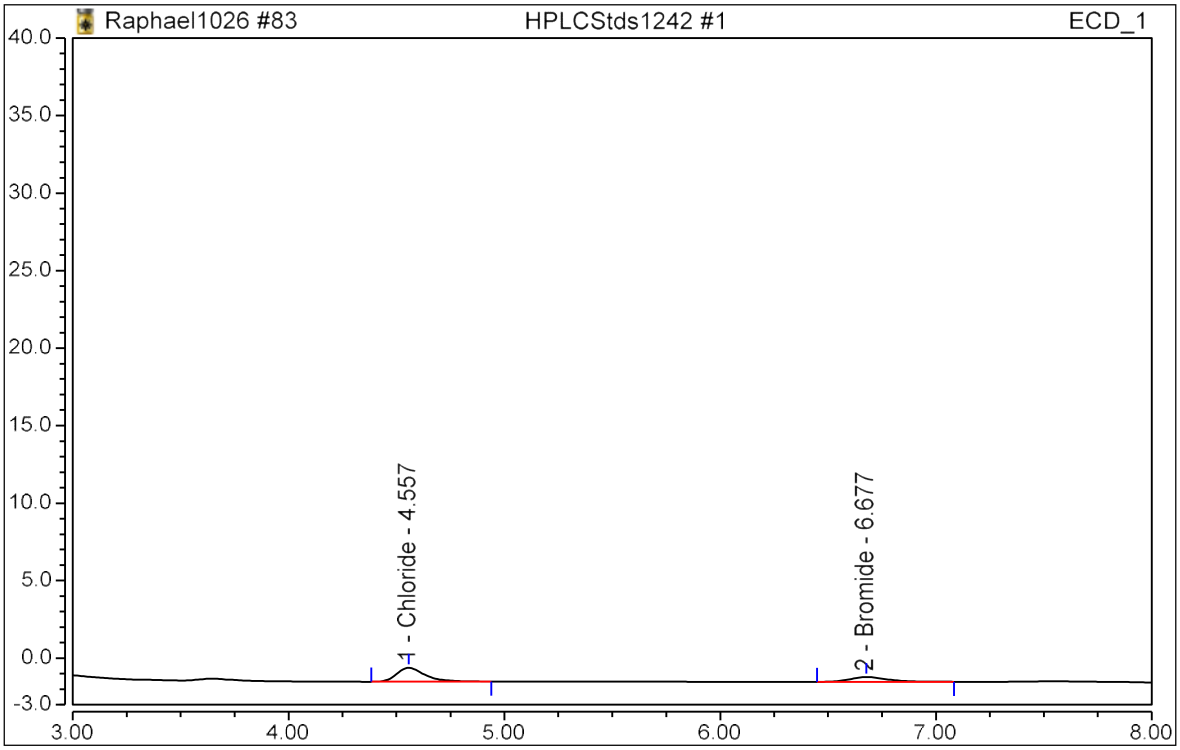
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 07:10**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.137	0.902	1.01917	FALSE	FALSE
2	6.67	Bromide	0.060	0.312	0.99622	FALSE	FALSE

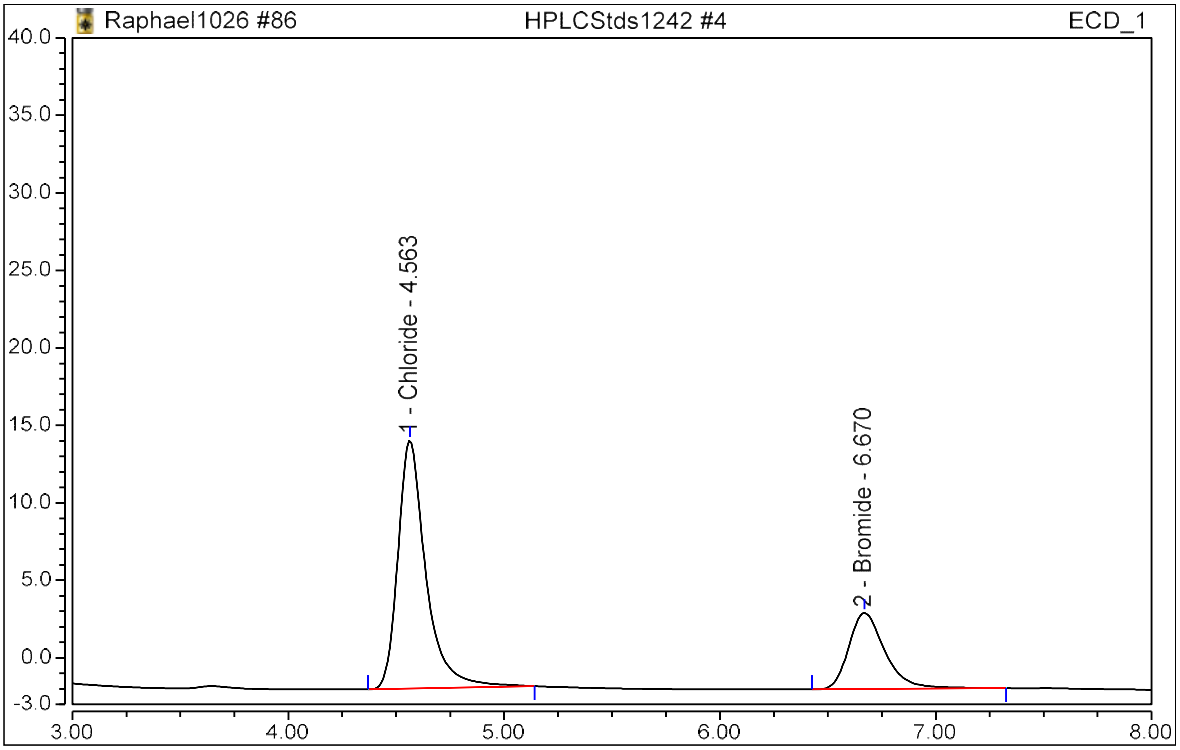
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 07:39**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	0.137	0.899	1.01727	FALSE	FALSE
2	6.68	Bromide	0.060	0.312	1.00967	FALSE	FALSE

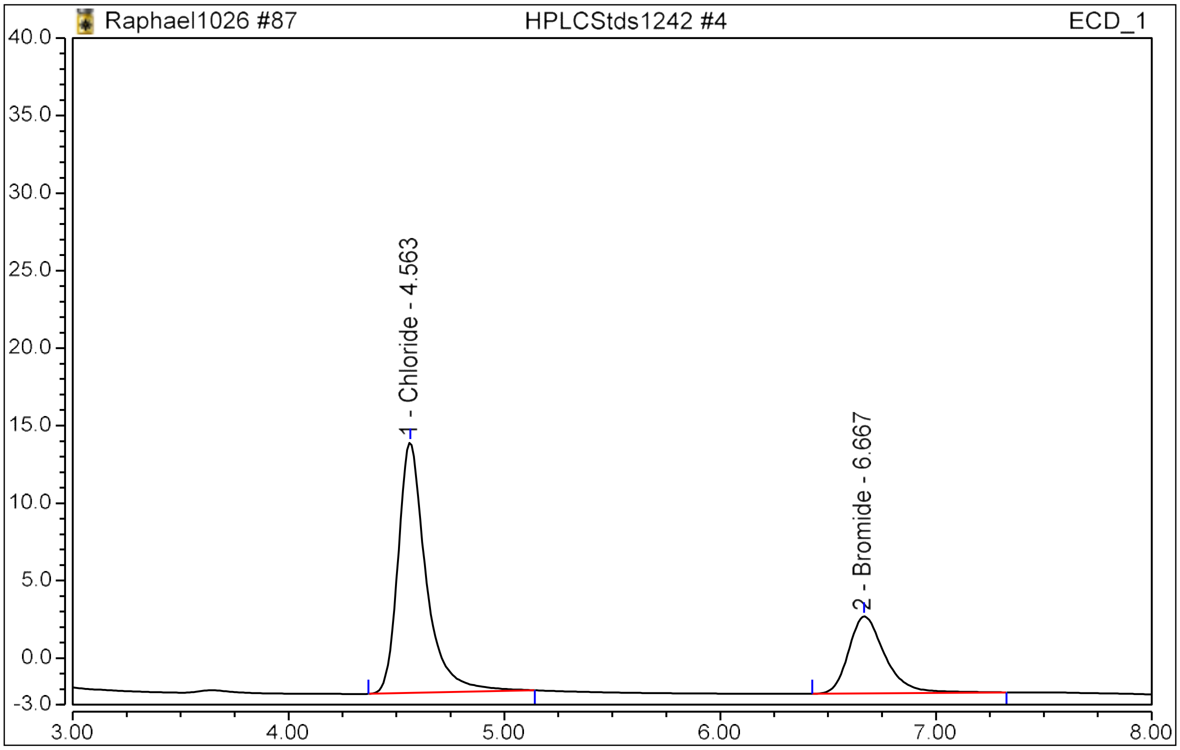
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 12:40**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.409	16.025	15.09064	FALSE	FALSE
2	6.67	Bromide	0.963	4.930	14.94309	FALSE	FALSE

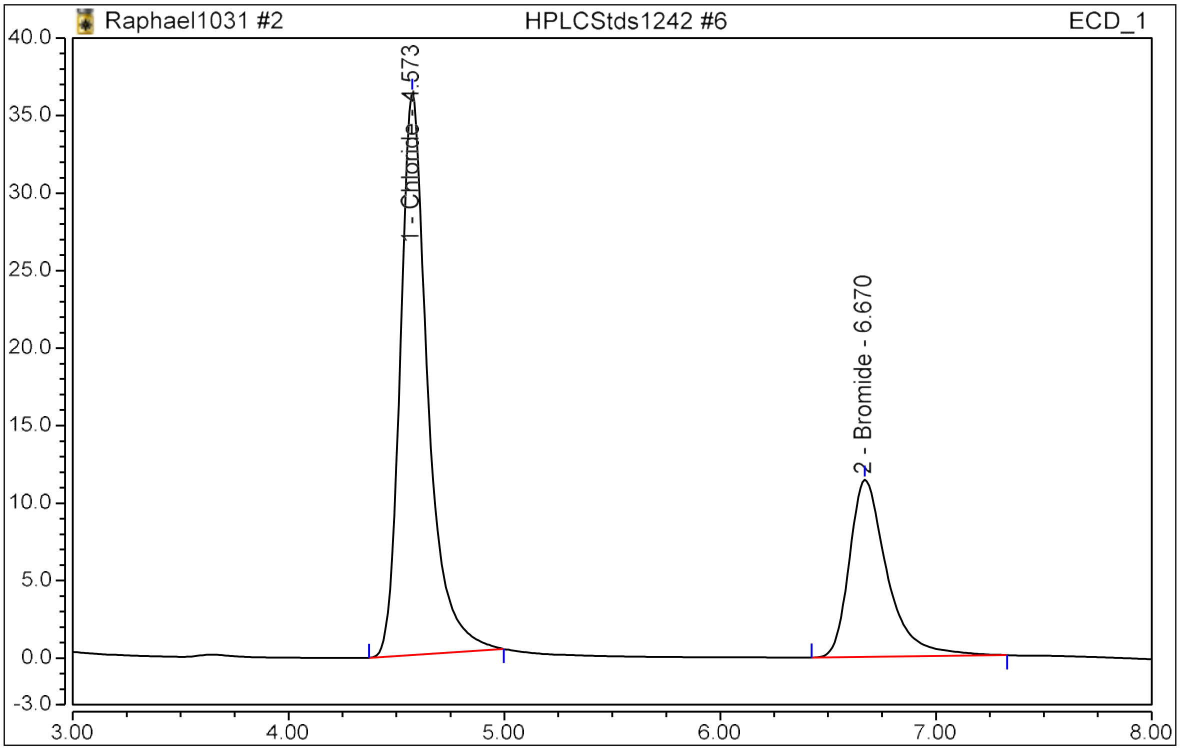
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**30-Dec-2021 / 13:09**	Run Time:	**28.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.429	16.156	15.19912	FALSE	FALSE
2	6.67	Bromide	0.969	4.966	15.02608	FALSE	FALSE

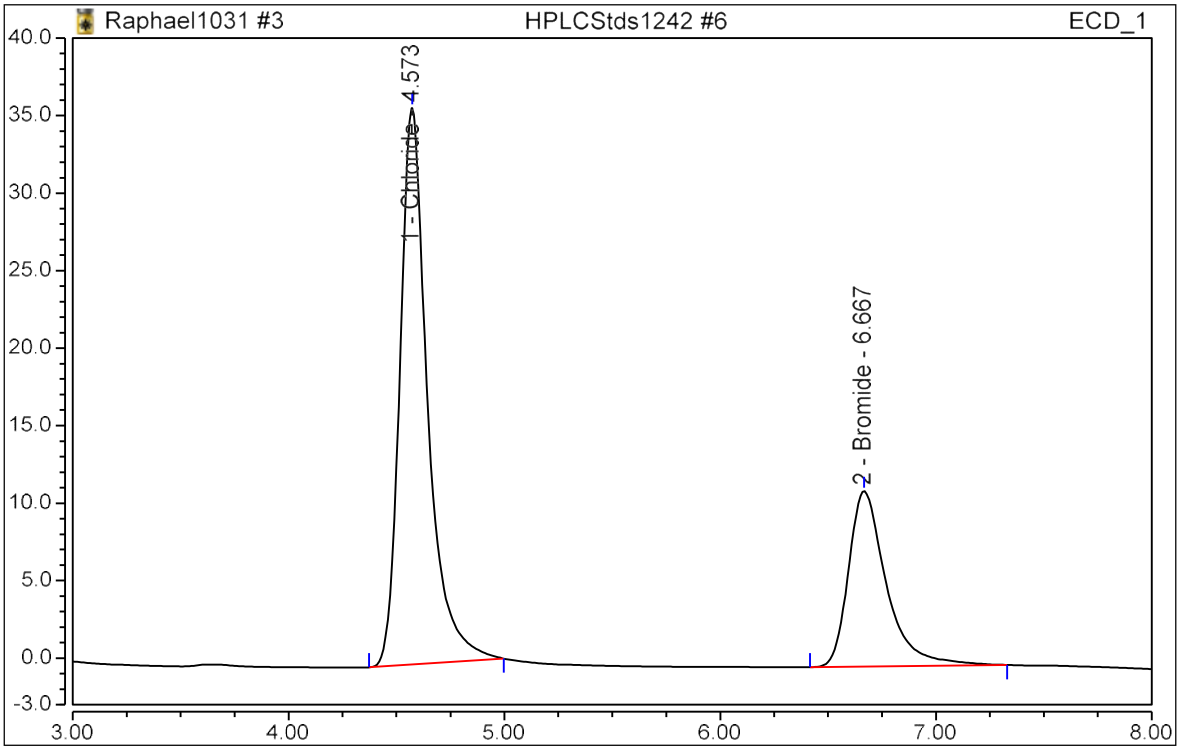
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 15:42**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	5.377	36.250	30.16352	FALSE	FALSE
2	6.67	Bromide	2.314	11.419	30.16186	FALSE	FALSE

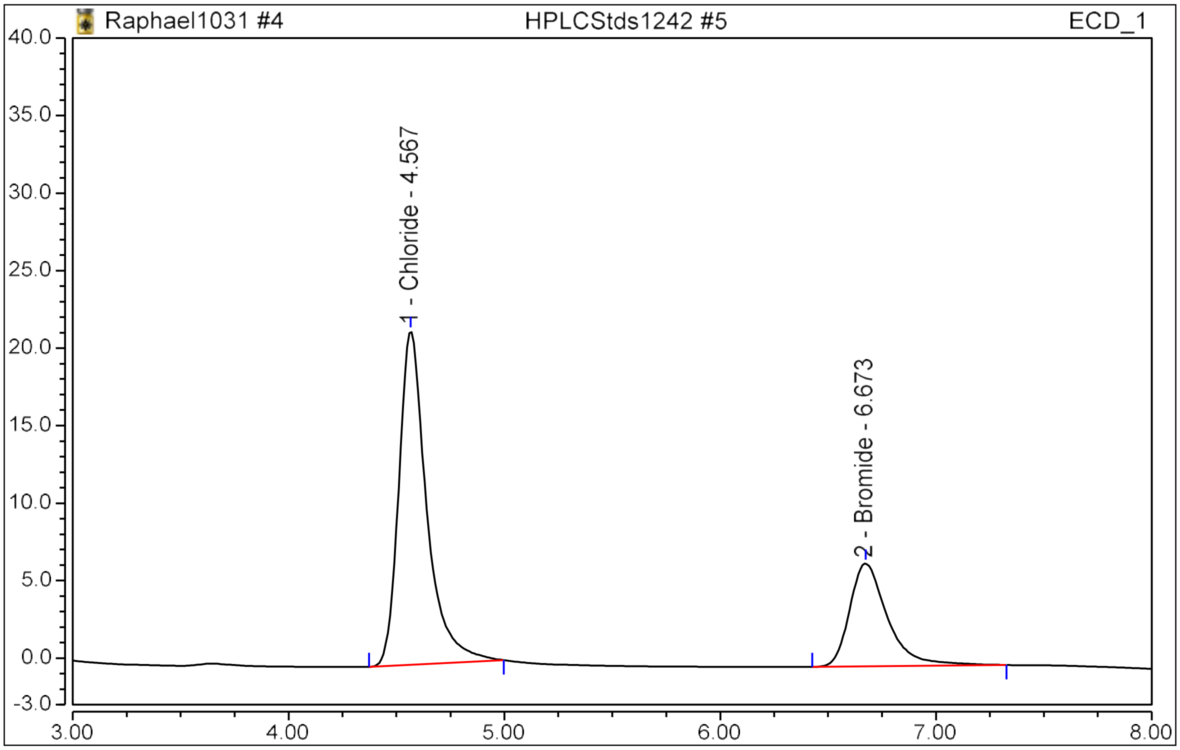
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 16:12**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	5.334	35.906	29.97677	FALSE	FALSE
2	6.67	Bromide	2.302	11.325	30.04307	FALSE	FALSE

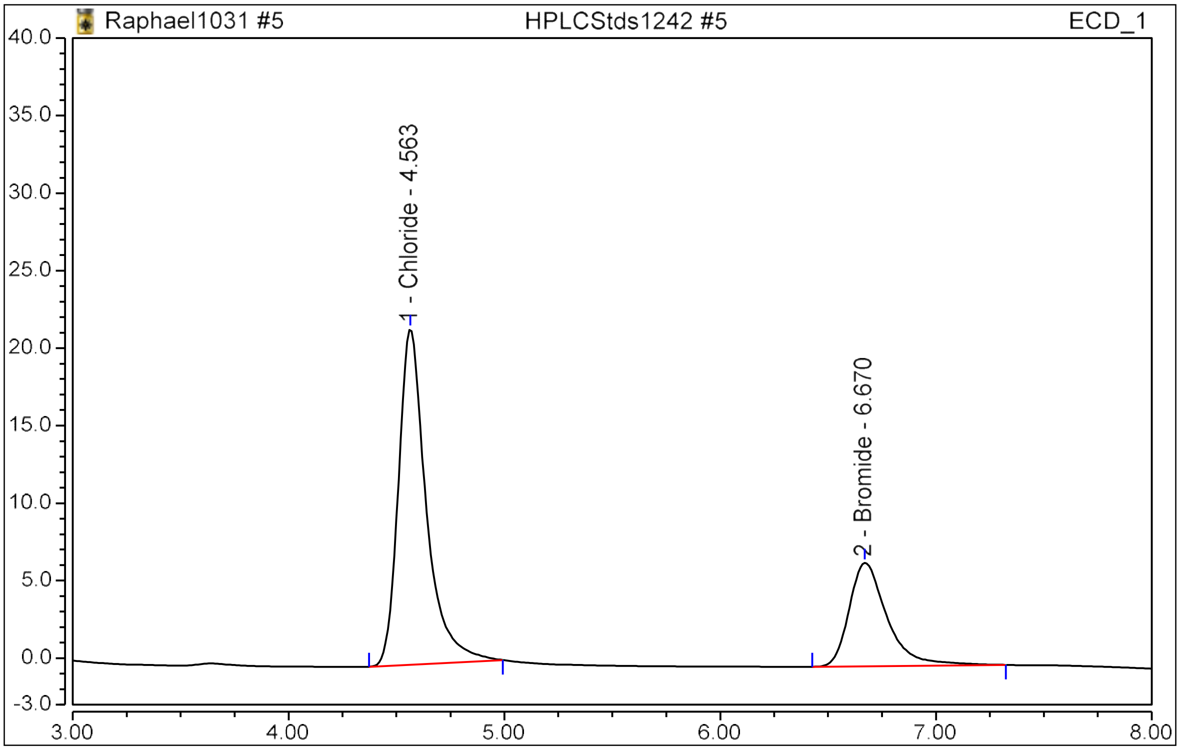
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 16:43**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.57	Chloride	3.229	21.544	19.72094	FALSE	FALSE
2	6.67	Bromide	1.356	6.646	19.71342	FALSE	FALSE

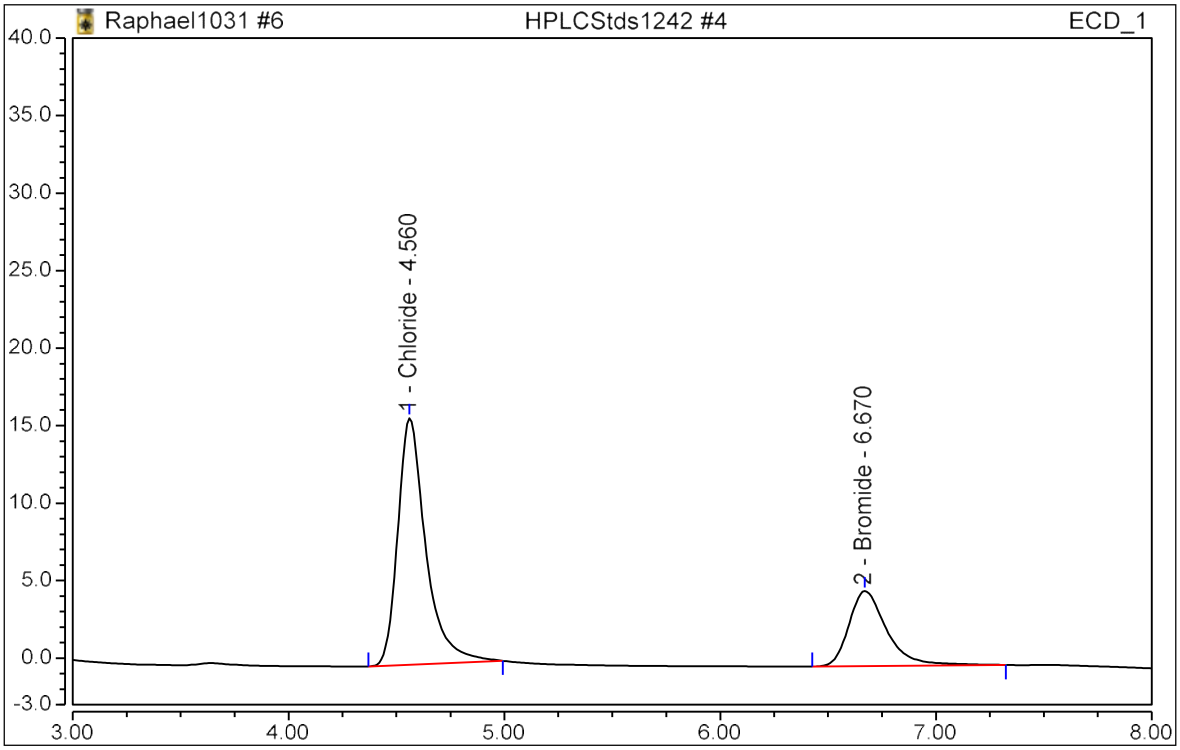
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 17:14**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	3.247	21.663	19.81755	FALSE	FALSE
2	6.67	Bromide	1.362	6.684	19.79072	FALSE	FALSE

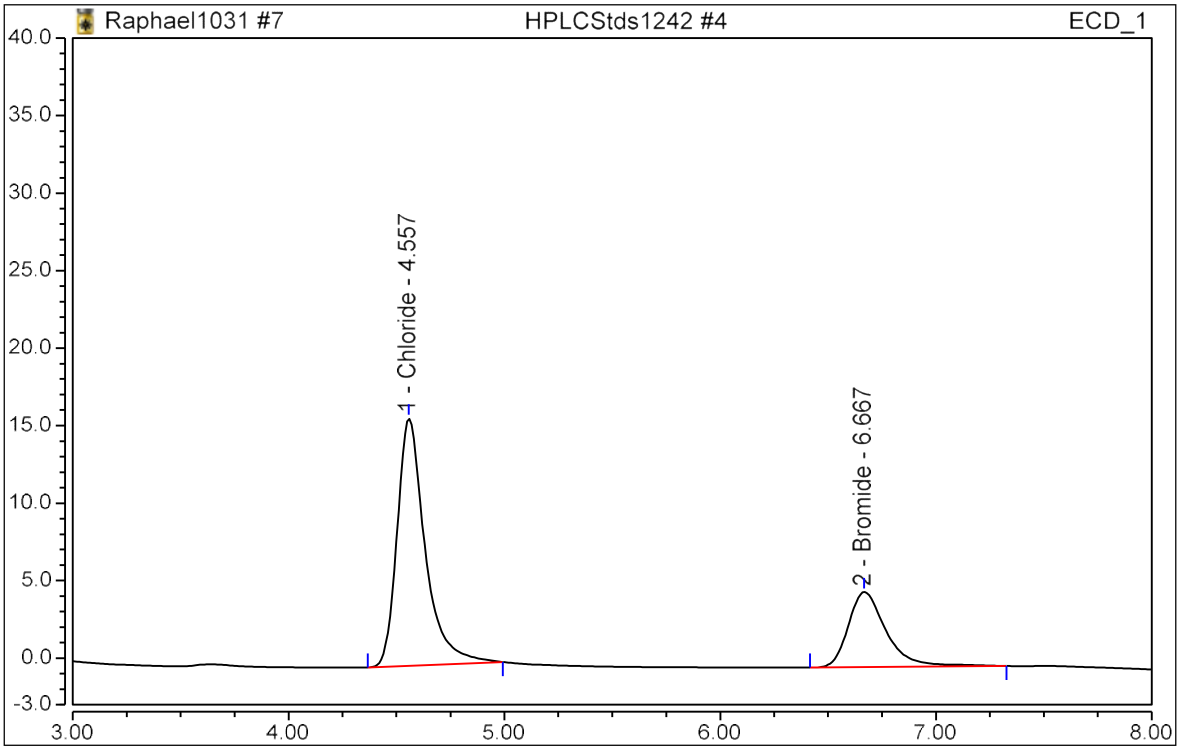
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 17:44**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.397	15.916	15.11390	FALSE	FALSE
2	6.67	Bromide	0.987	4.849	14.91898	FALSE	FALSE

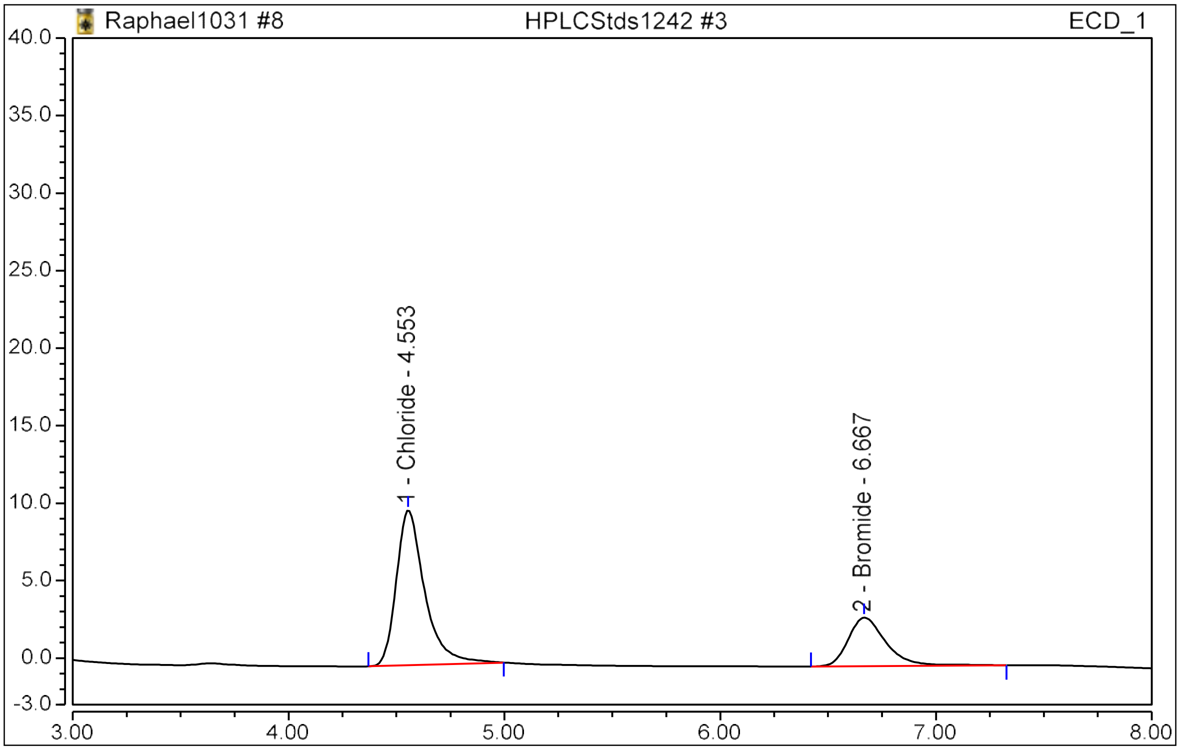
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 18:15**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	2.404	15.960	15.15308	FALSE	FALSE
2	6.67	Bromide	0.990	4.852	14.95998	FALSE	FALSE

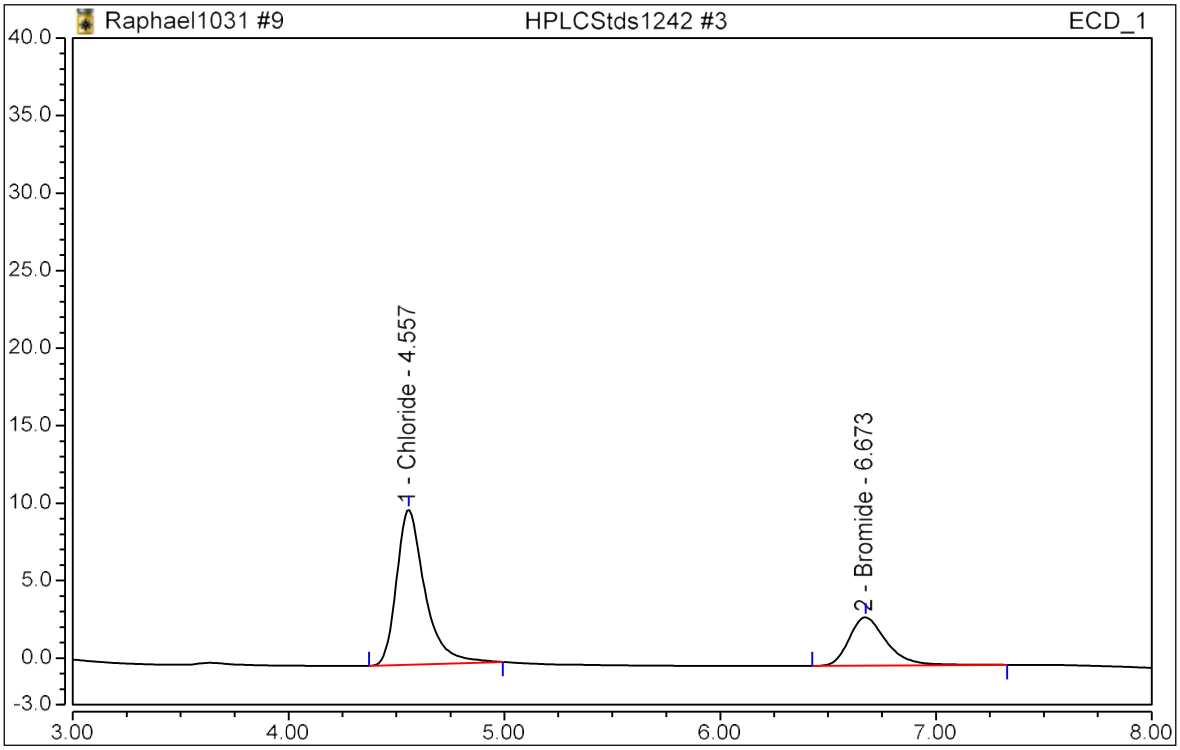
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 18:46**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	1.524	10.003	9.93883	FALSE	FALSE
2	6.67	Bromide	0.638	3.137	9.99465	FALSE	FALSE

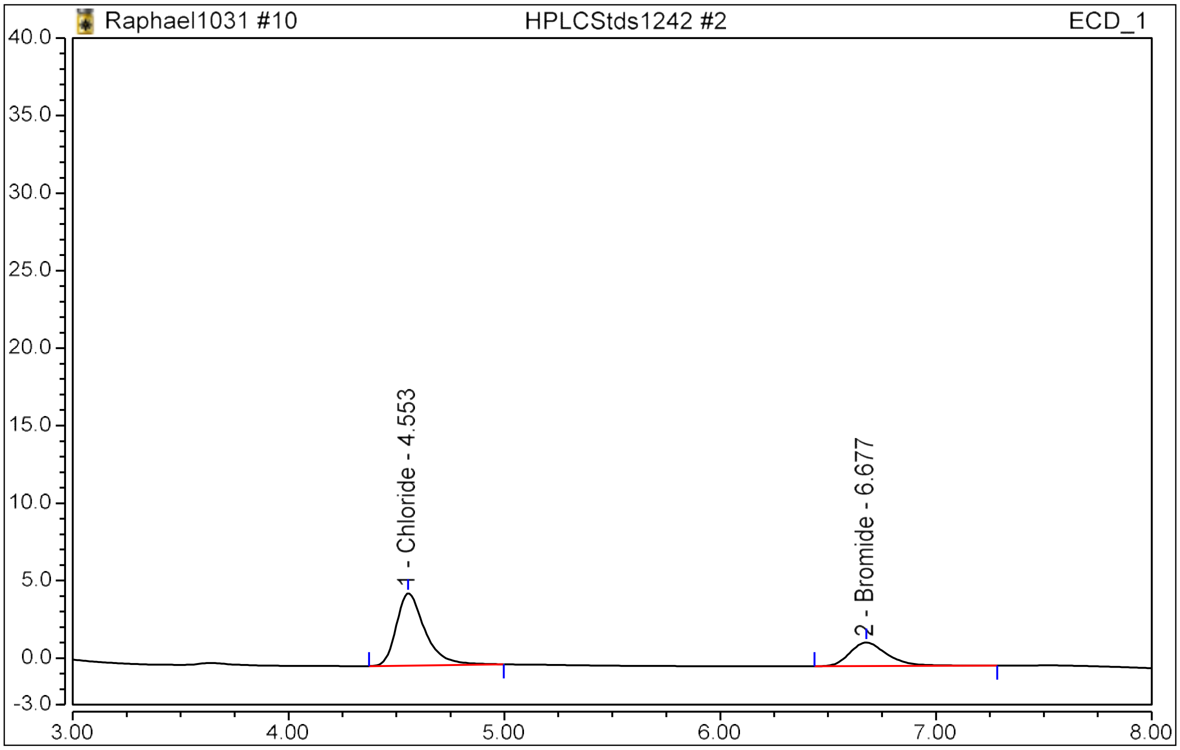
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 19:16**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	1.523	10.002	9.93046	FALSE	FALSE
2	6.67	Bromide	0.639	3.128	9.99942	FALSE	FALSE

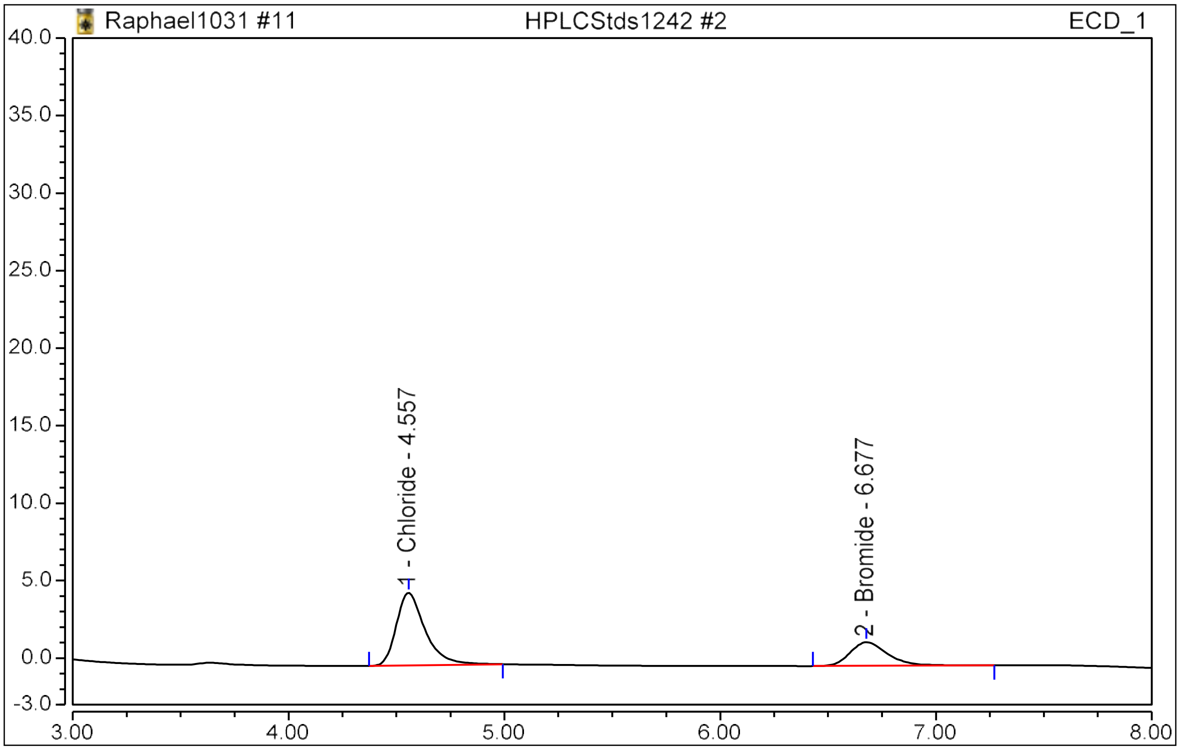
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 19:47**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.717	4.663	4.84651	FALSE	FALSE
2	6.68	Bromide	0.308	1.524	4.97489	FALSE	FALSE

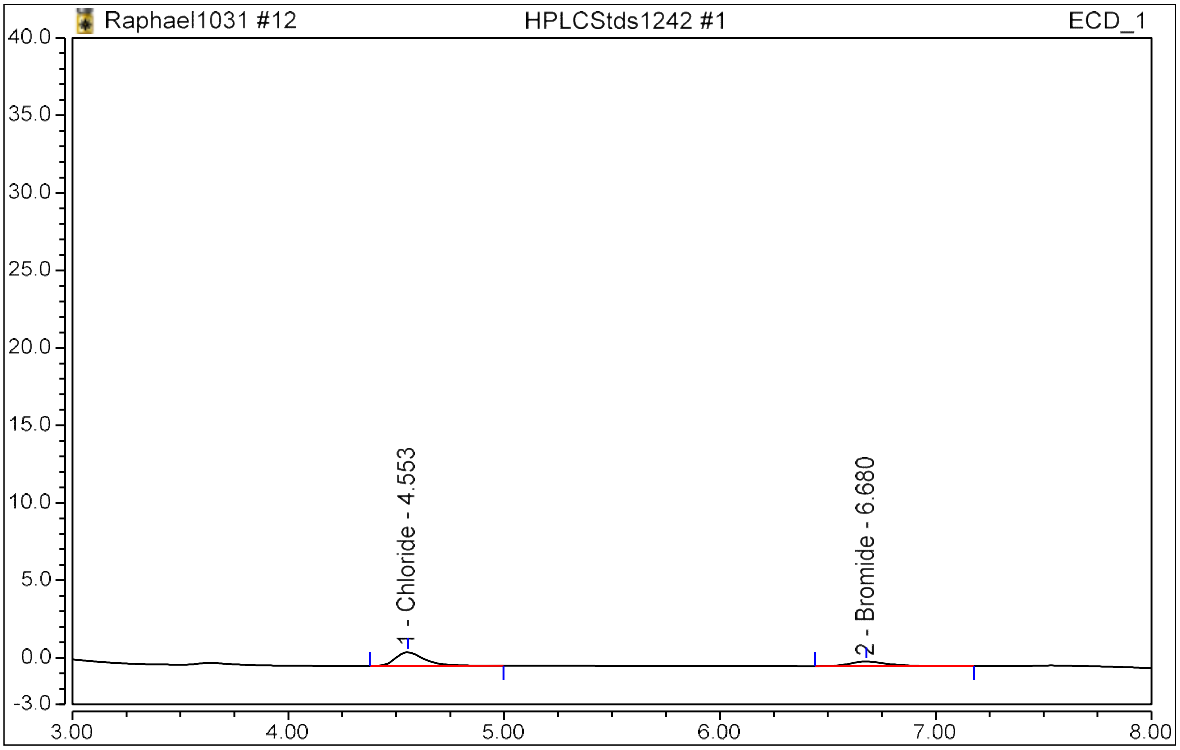
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 20:18**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.56	Chloride	0.725	4.690	4.89580	FALSE	FALSE
2	6.68	Bromide	0.311	1.531	5.01368	FALSE	FALSE

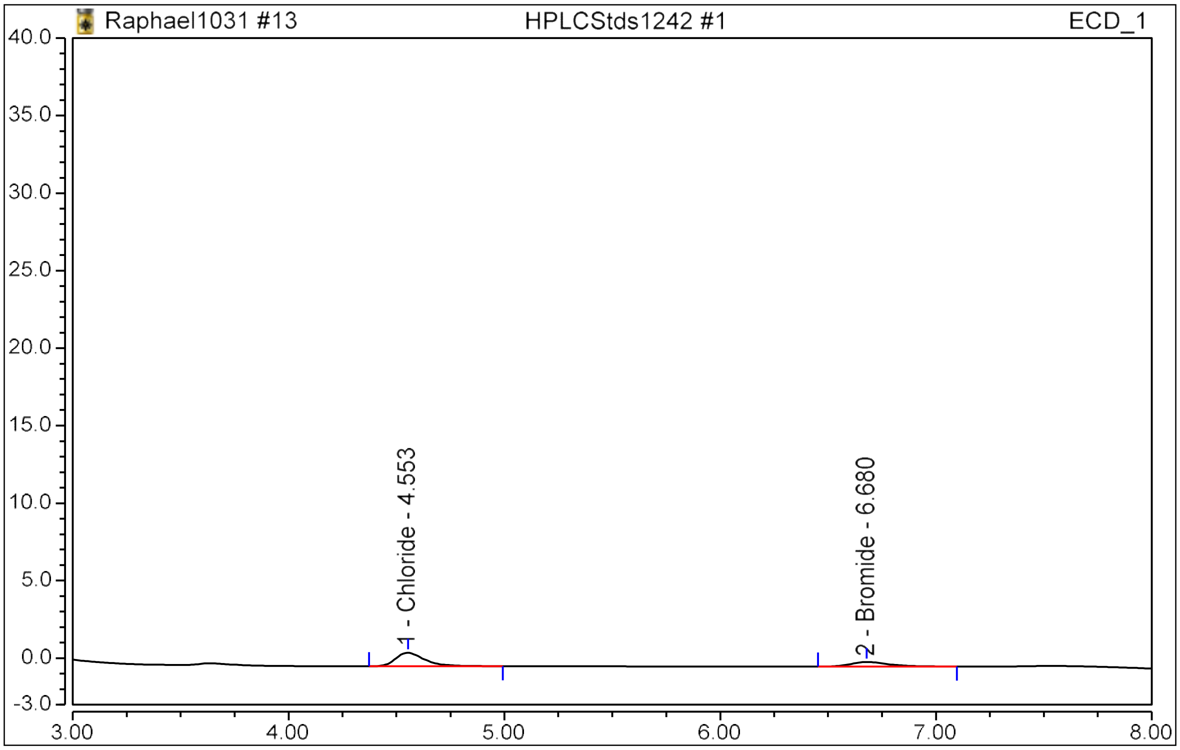
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 20:48**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.138	0.884	1.00621	FALSE	FALSE
2	6.68	Bromide	0.061	0.301	0.99494	FALSE	FALSE

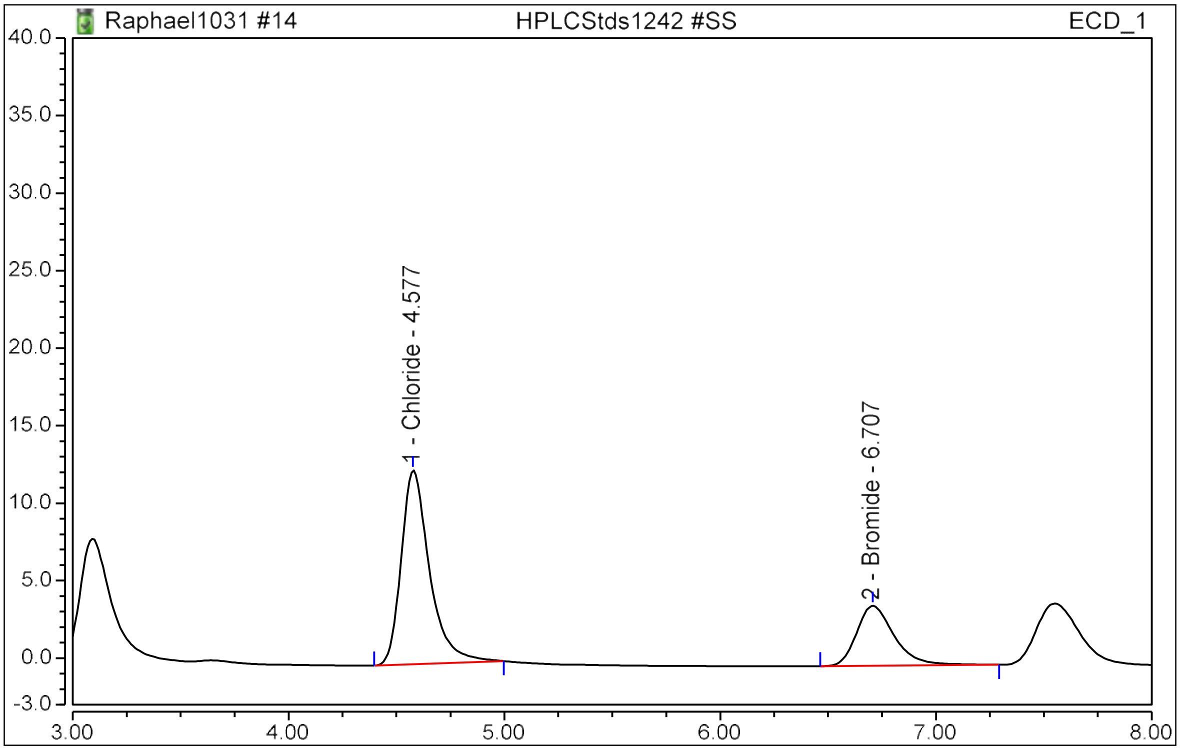
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 21:19**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.138	0.882	1.00453	FALSE	FALSE
2	6.68	Bromide	0.060	0.299	0.97779	FALSE	FALSE

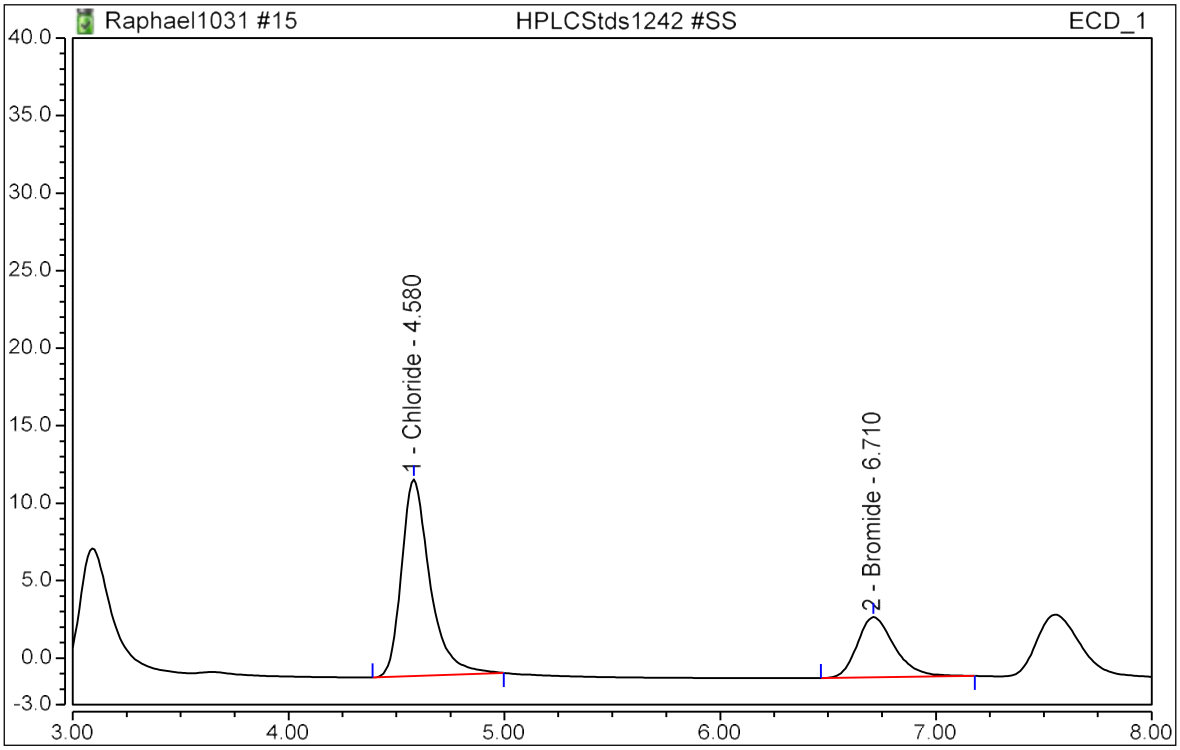
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 21:50**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	1.910	12.519	12.26650	FALSE	FALSE
2	6.71	Bromide	0.786	3.869	12.12026	FALSE	FALSE

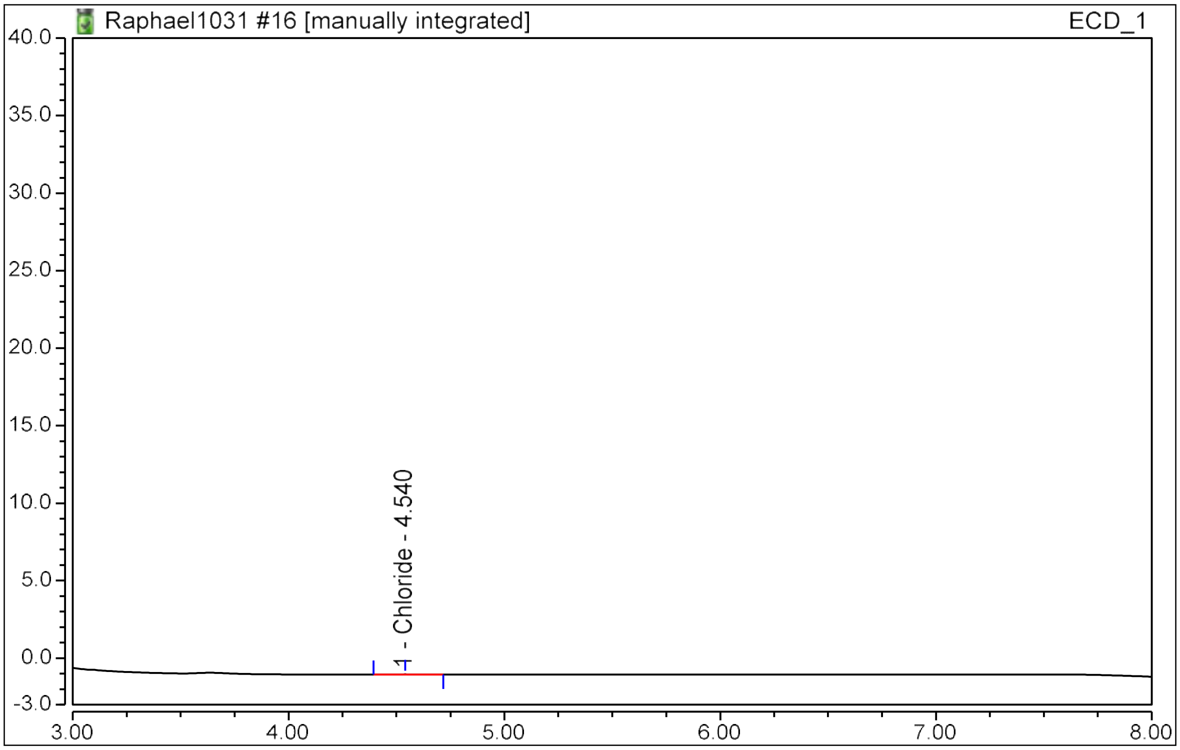
Sample Name:	**HPLCStds1242 #SS**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 22:20**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	1.939	12.684	12.44447	FALSE	FALSE
2	6.71	Bromide	0.779	3.891	12.02428	FALSE	FALSE

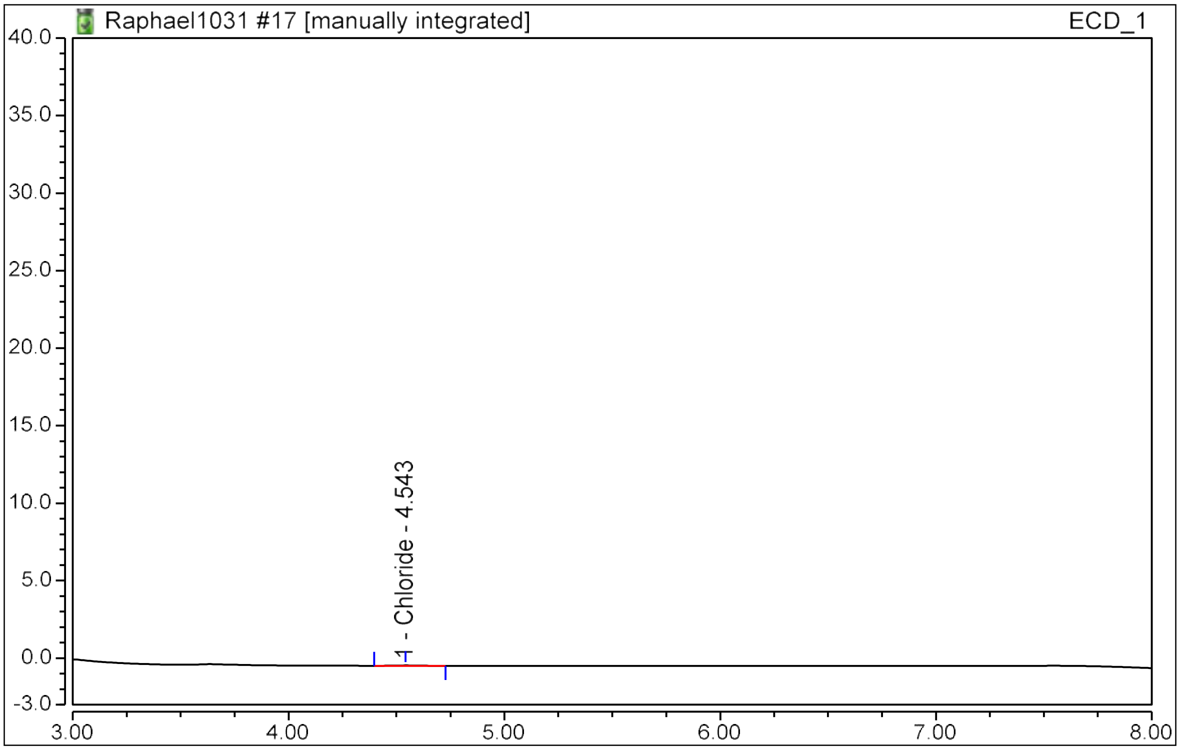
Sample Name:	**HPLCStds1242 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 22:51**	Run Time:	**29.00**



Analyst Comment: NI PRM 1/6/22

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	0.003	0.024	0.08872	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

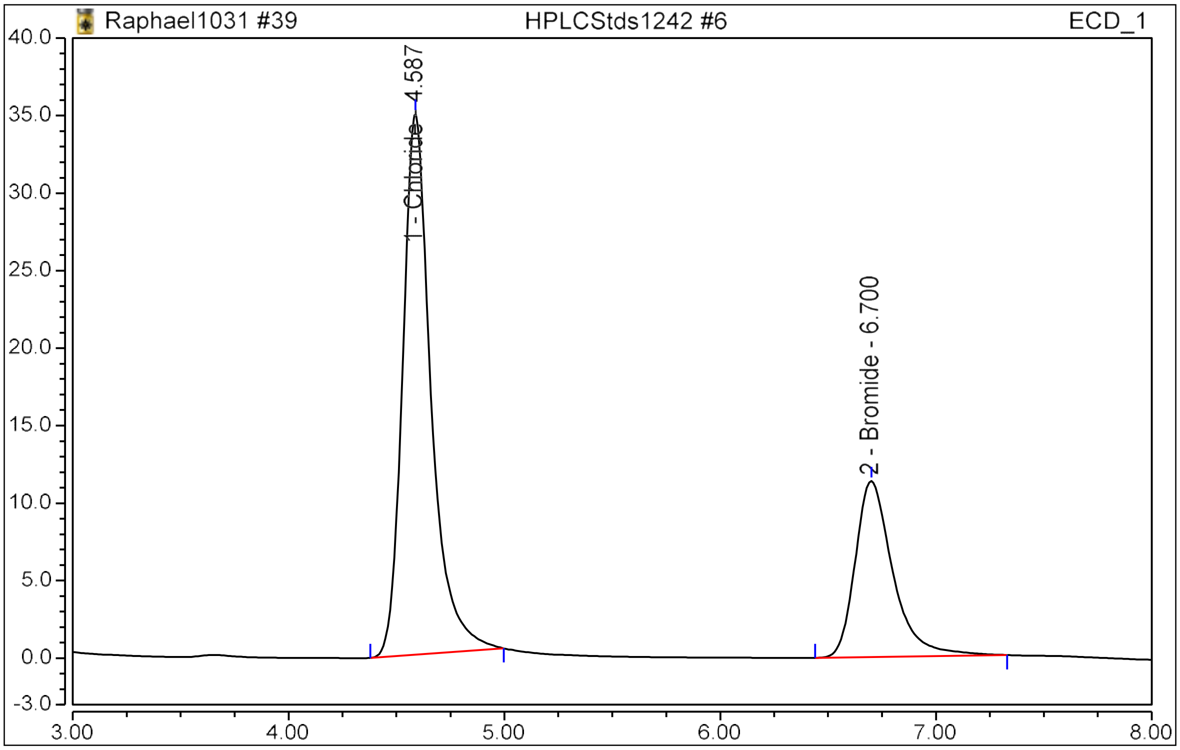
Sample Name:	**HPLCStds1242 #RB**	Injection Volume:	**25.00**
Injection Type:	**Check Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**04-Jan-2022 / 23:22**	Run Time:	**29.00**



Analyst Comment: NI PRM 1/6/22

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	0.003	0.023	0.08813	FALSE	TRUE
n.a.	n.a.	Bromide	n.a.	n.a.	n.a.	n.a.	n.a.

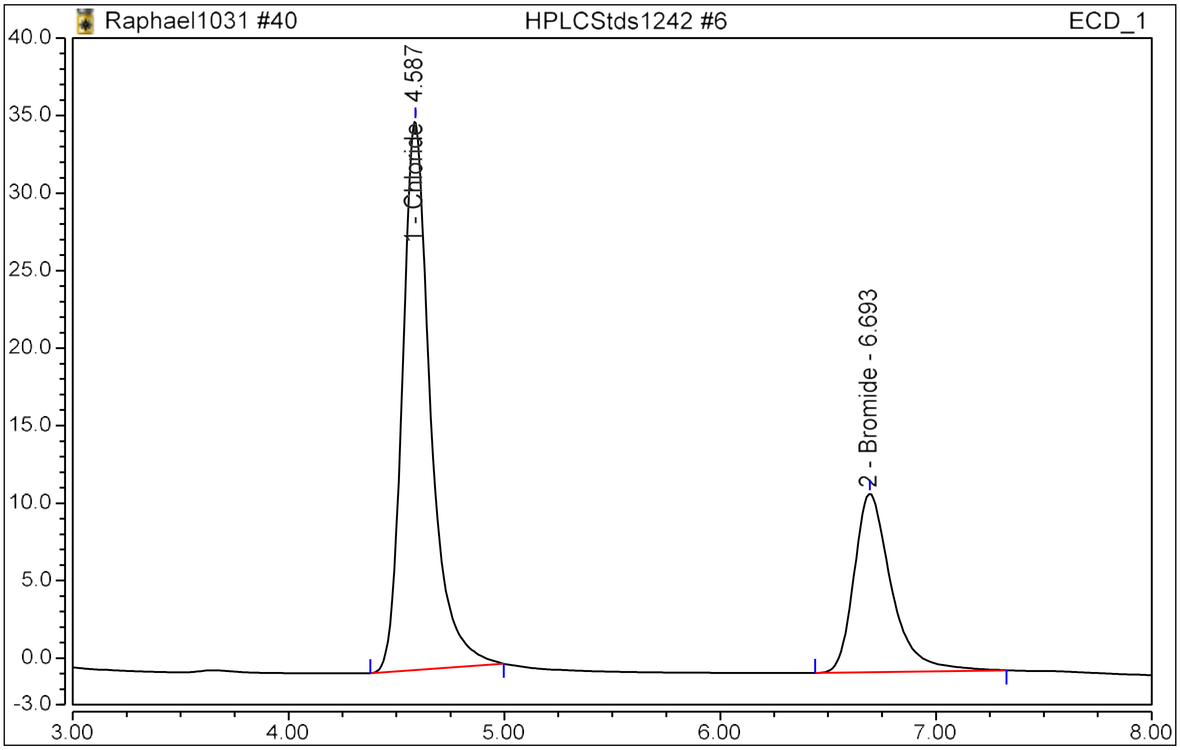
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 10:37**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.59	Chloride	5.329	34.908	29.95414	FALSE	FALSE
2	6.70	Bromide	2.300	11.355	30.02569	FALSE	FALSE

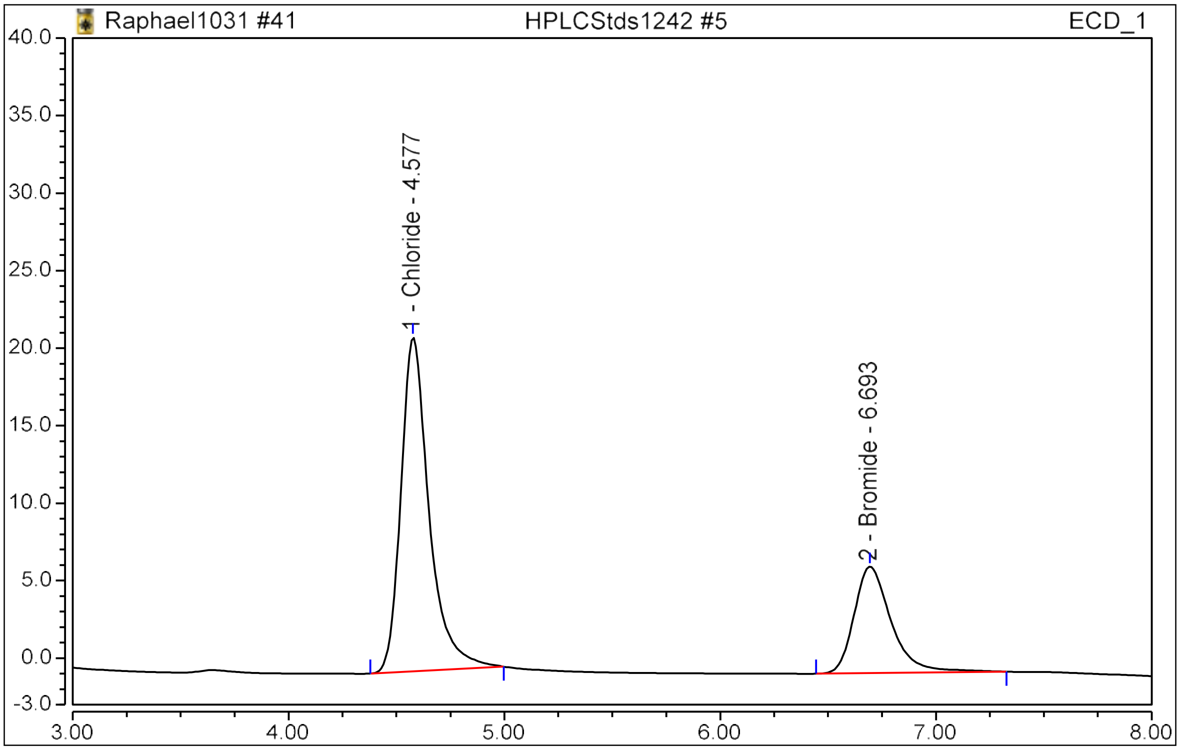
Sample Name:	**HPLCStds1242 #6**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 11:07**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.59	Chloride	5.341	35.381	30.00661	FALSE	FALSE
2	6.69	Bromide	2.308	11.511	30.10104	FALSE	FALSE

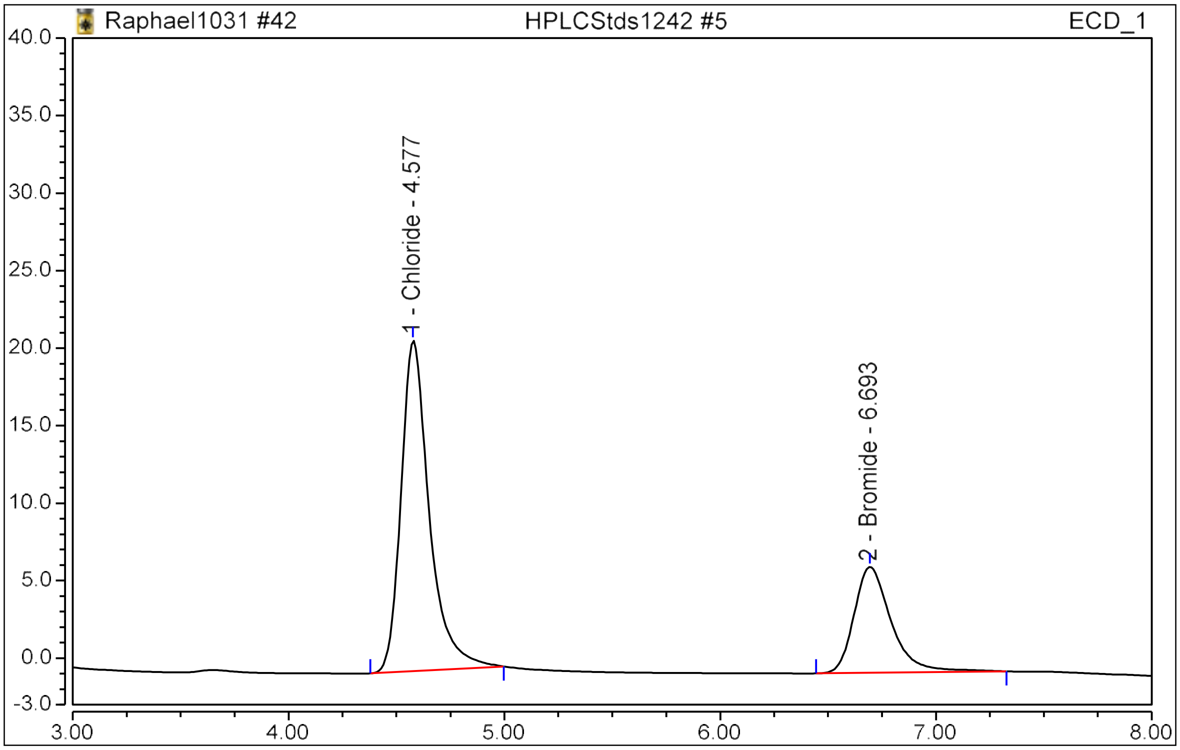
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 11:38**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	3.262	21.552	19.89746	FALSE	FALSE
2	6.69	Bromide	1.368	6.866	19.86114	FALSE	FALSE

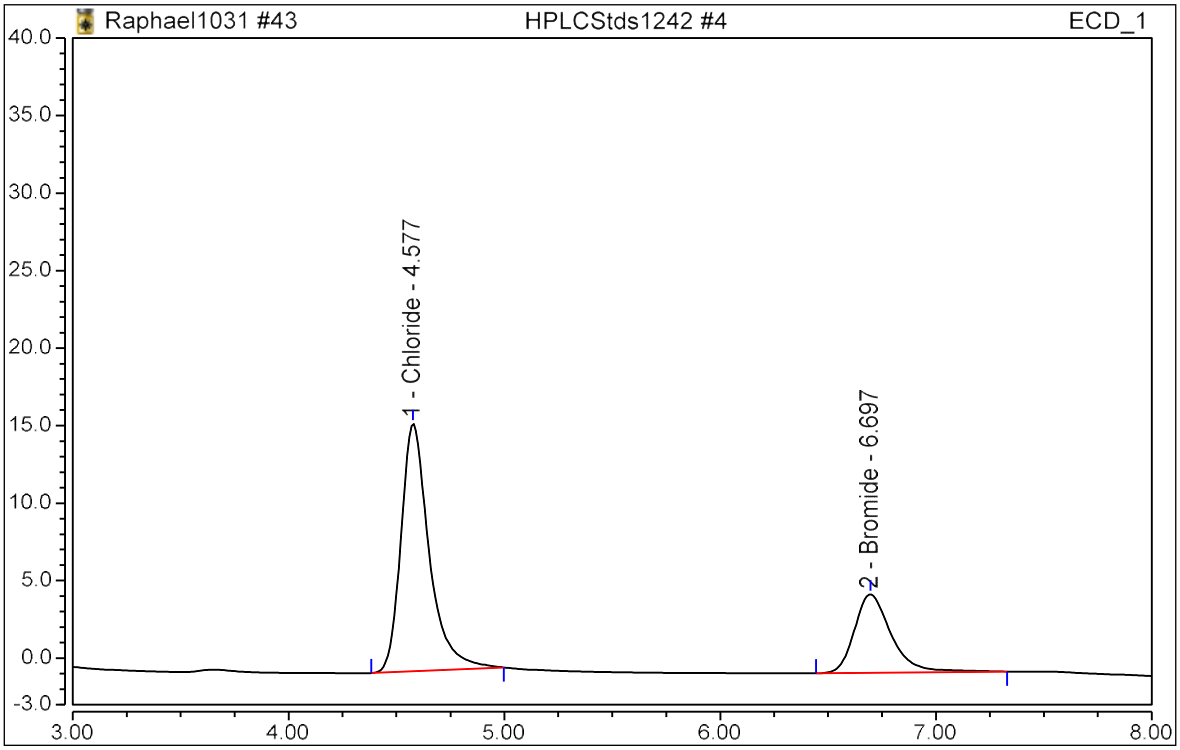
Sample Name:	**HPLCStds1242 #5**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 12:09**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	3.237	21.313	19.76836	FALSE	FALSE
2	6.69	Bromide	1.362	6.830	19.79289	FALSE	FALSE

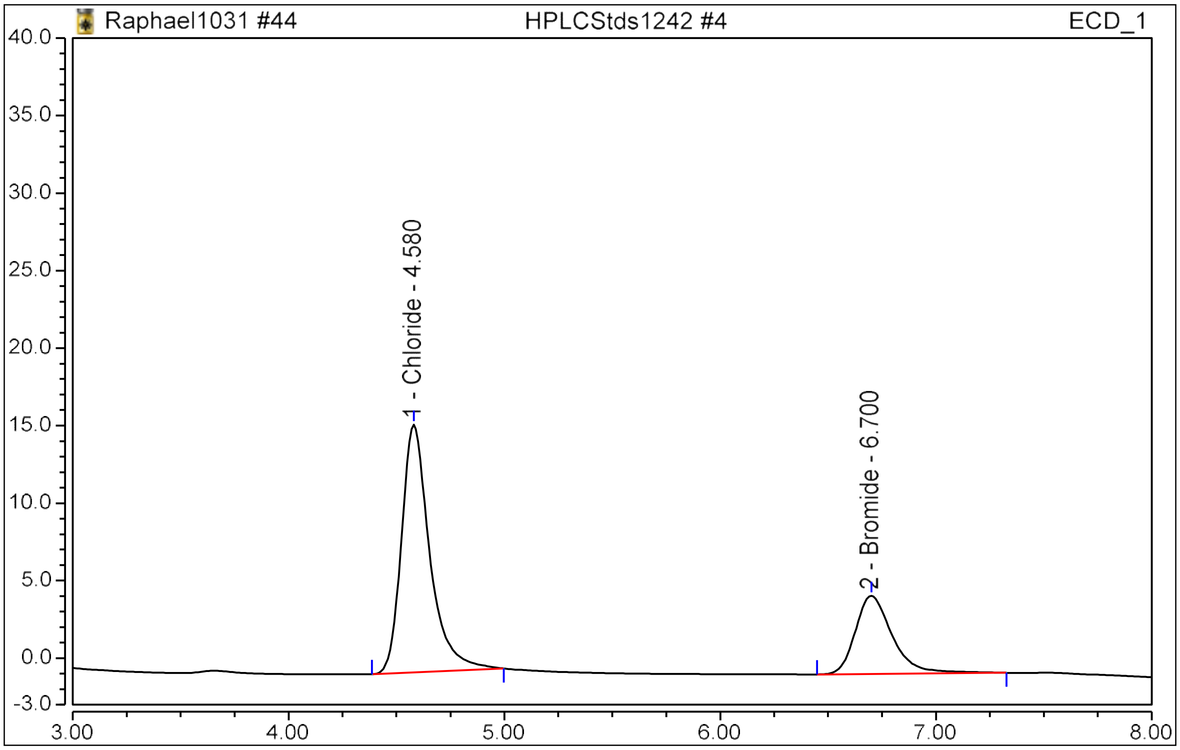
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 12:39**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	2.422	15.972	15.25739	FALSE	FALSE
2	6.70	Bromide	0.997	5.050	15.05839	FALSE	FALSE

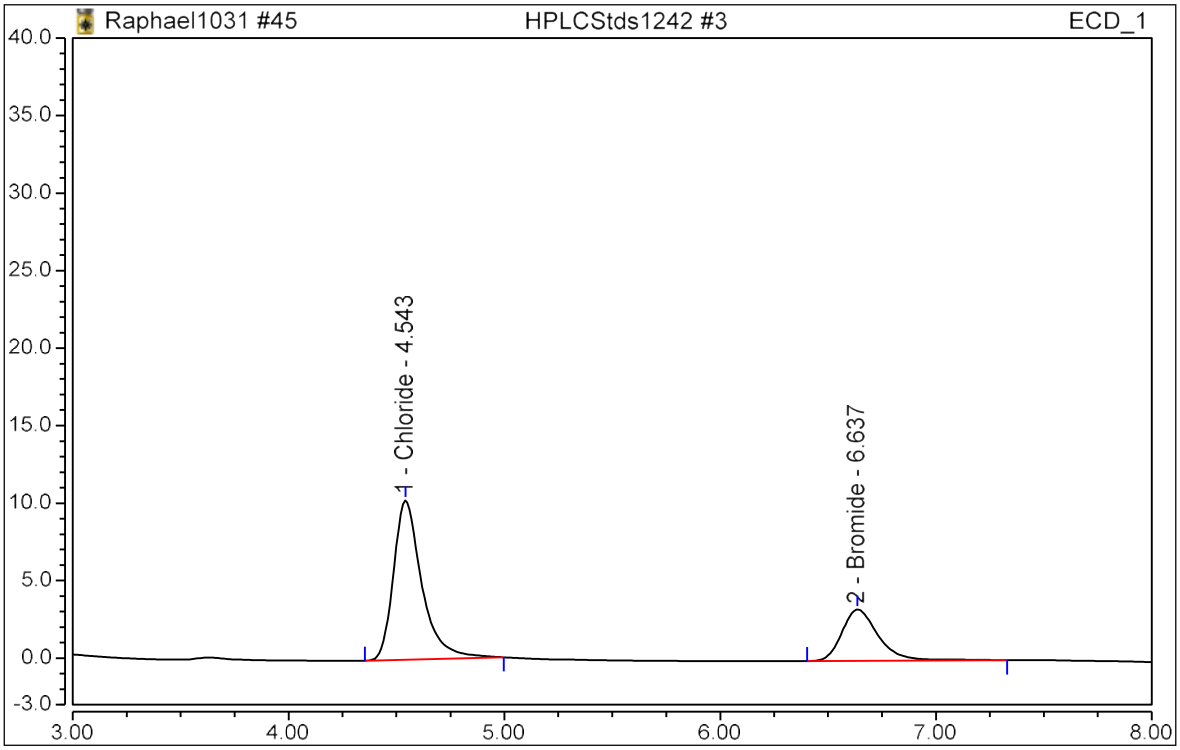
Sample Name:	**HPLCStds1242 #4**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 13:10**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.58	Chloride	2.421	15.977	15.25379	FALSE	FALSE
2	6.70	Bromide	0.995	5.033	15.02913	FALSE	FALSE

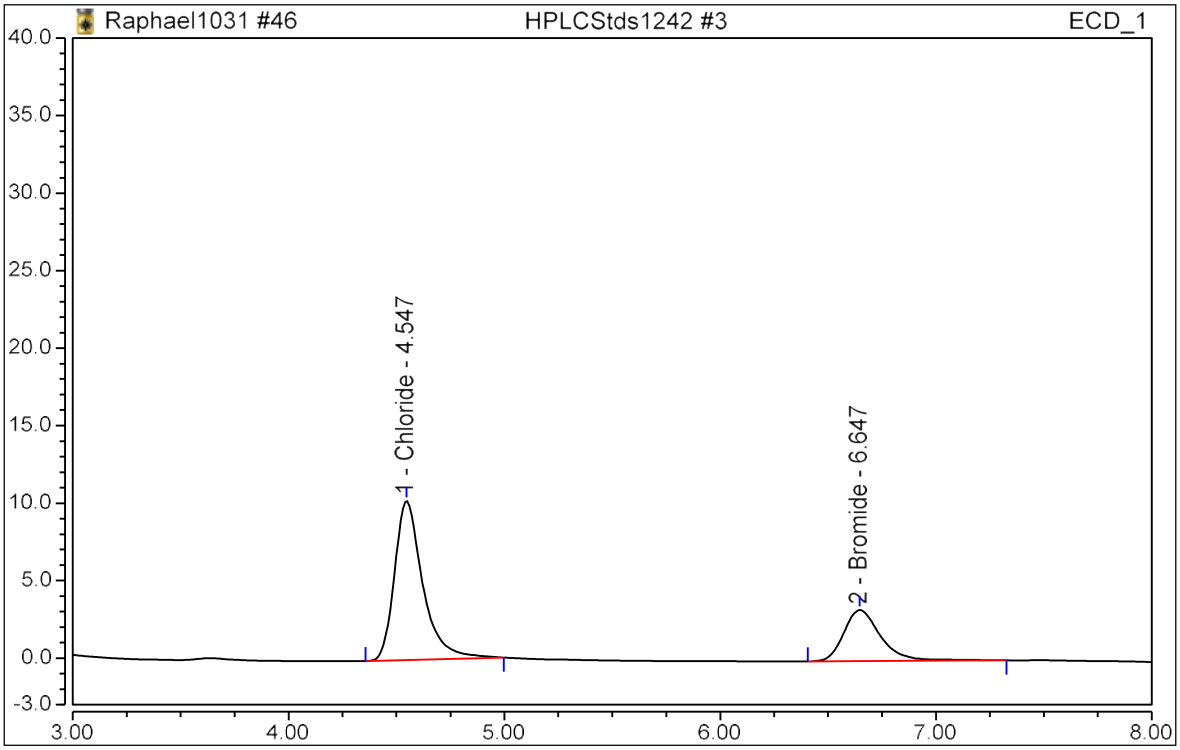
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 14:05**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	1.564	10.283	10.18446	FALSE	FALSE
2	6.64	Bromide	0.654	3.314	10.22722	FALSE	FALSE

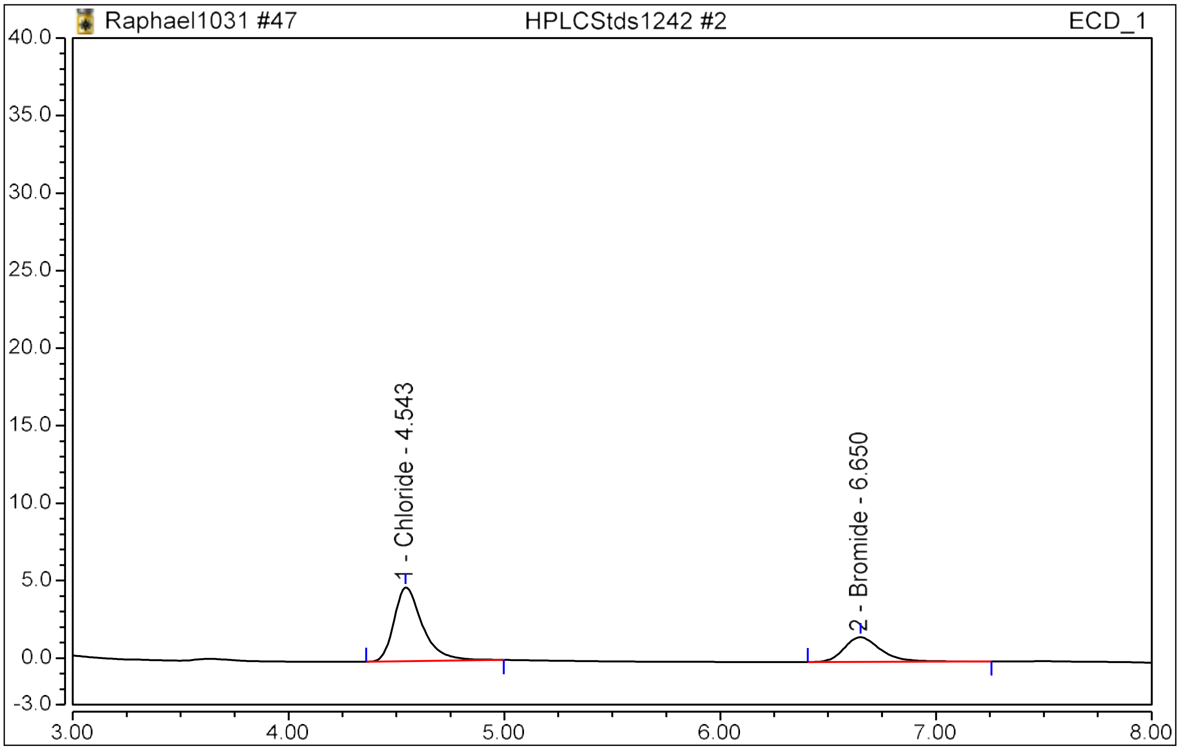
Sample Name:	**HPLCStds1242 #3**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 14:35**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	1.562	10.278	10.16818	FALSE	FALSE
2	6.65	Bromide	0.654	3.298	10.22442	FALSE	FALSE

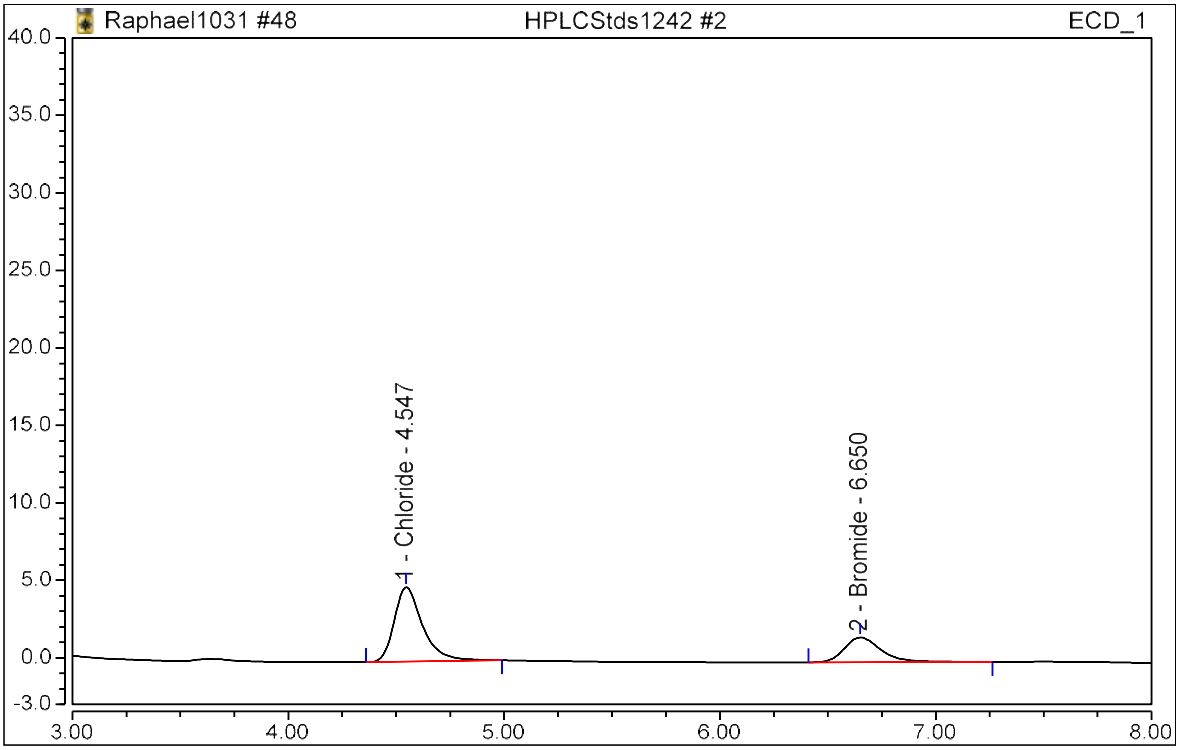
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 15:06**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	0.730	4.770	4.93100	FALSE	FALSE
2	6.65	Bromide	0.312	1.595	5.04021	FALSE	FALSE

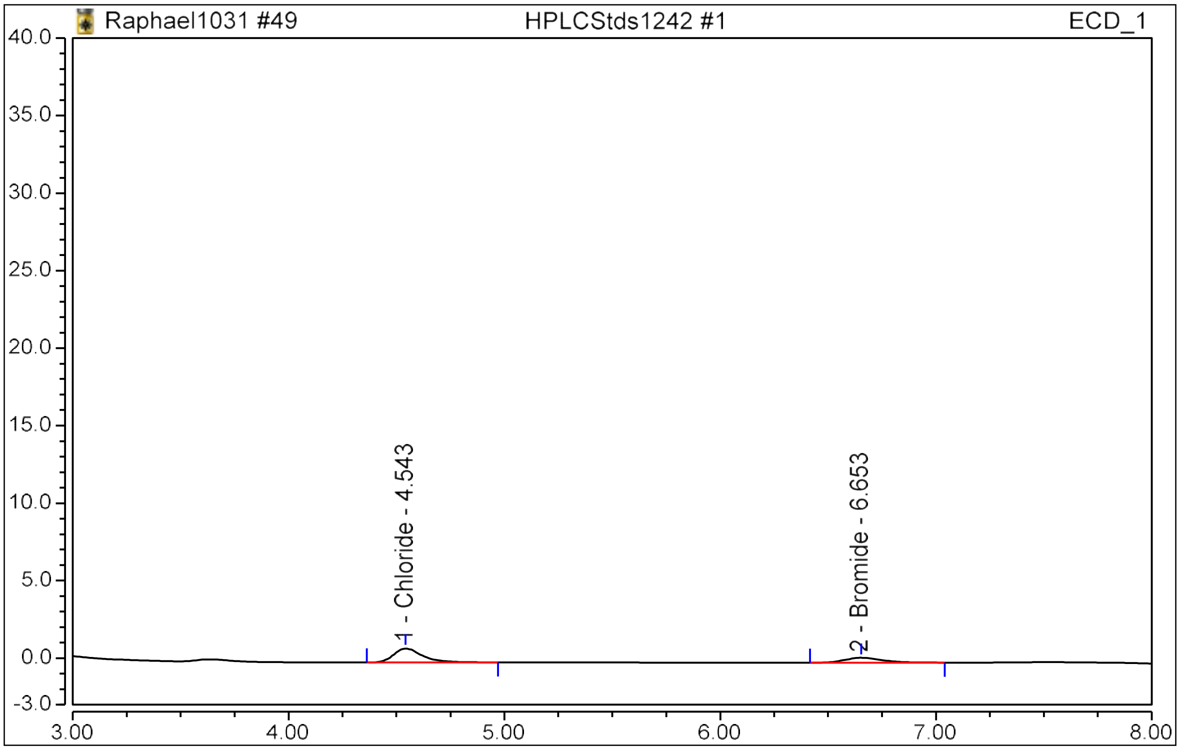
Sample Name:	**HPLCStds1242 #2**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 15:37**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.733	4.813	4.94591	FALSE	FALSE
2	6.65	Bromide	0.315	1.606	5.07786	FALSE	FALSE

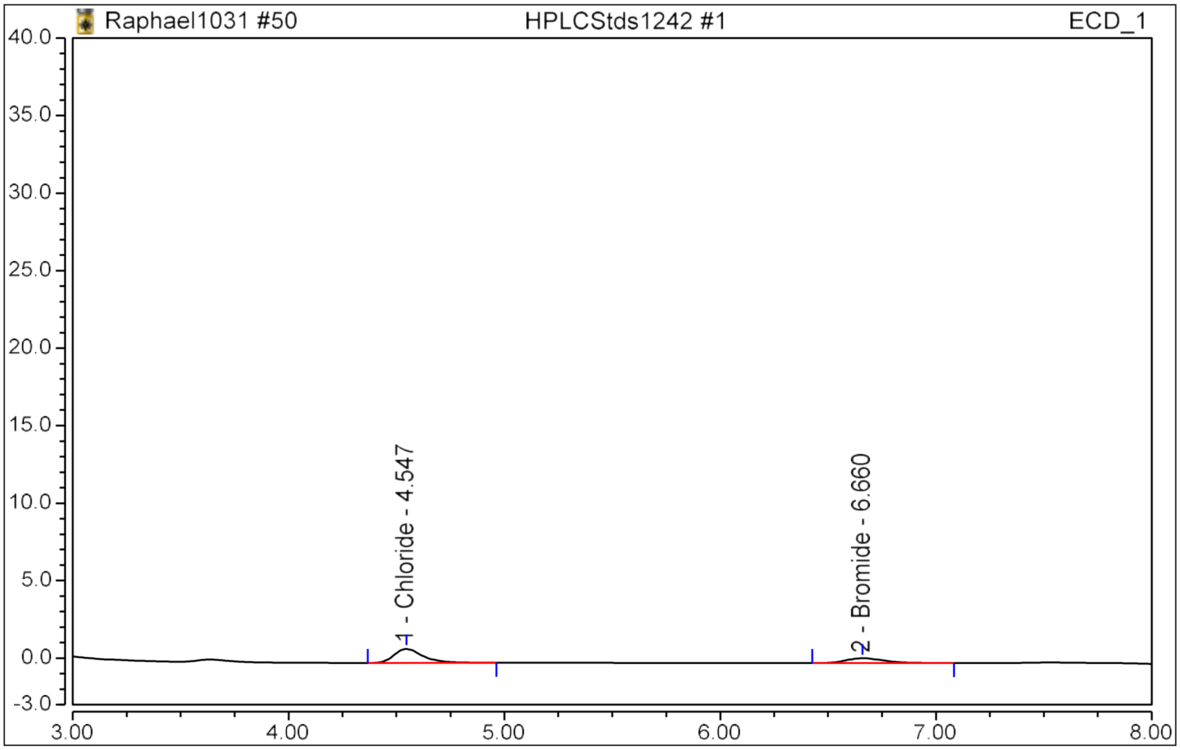
Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 16:07**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.54	Chloride	0.139	0.907	1.01354	FALSE	FALSE
2	6.65	Bromide	0.061	0.317	0.99492	FALSE	FALSE

Sample Name:	**HPLCStds1242 #1**	Injection Volume:	**25.00**
Injection Type:	**Calibration Standard**	Dilution Factor:	**1.0**
Instrument Method:	**AS22 ASAP Base**	Operator:	**PMann**
Inj. Date / Time:	**05-Jan-2022 / 16:38**	Run Time:	**29.00**



Analyst Comment:

No.	Time min	Peak Name	Area µS*min	Height µS	Conc µg/mL	Manually Assigned?	Manipulated?
1	4.55	Chloride	0.139	0.904	1.01423	FALSE	FALSE
2	6.66	Bromide	0.061	0.314	0.99973	FALSE	FALSE

This Is The Last Page Of This Report.

ENTHALPY
ANALYTICAL

APPENDIX D
QUALITY ASSURANCE/QUALITY CONTROL

Appendix D.1
Units and Abbreviations

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:	MB 30
Meter ID (if applicable):	
Orifice set ID:	TV1
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:	**0.9954**
ΔH@:	**1.7577**

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)
0.18	23.00	506.707	512.108	5.401		58		59	35	0.1812	24.0	59	59	59.4
0.46	30.00	512.108	523.620	11.512		59		63	44	0.2956	22.0	59	60	59.6
0.79	25.50	523.620	536.491	12.871		63		66	56	0.3857	21.0	60	60	59.9

— SAMPLE RATE —
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.18	0.240
0.46	0.391
0.79	0.510

-- DRY GAS METER --
VOLUME
CORRECTED

Vm(std) (cu ft)
5.539
11.757
13.068

—— ORIFICE ——

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.509	5.384
11.722	11.460
12.997	12.713

-- DRY GAS METER --
CALIBRATION FACTOR
Yd

Value (number)	Variation (number)
0.9947	-0.001
0.9970	0.002
0.9946	-0.001

—— ORIFICE ——
CALIBRATION FACTOR
ΔH@

Value (in H2O)	Variation (in H2O)
1.809	0.052
1.730	-0.028
1.734	-0.024

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	0.9954
Average ΔH@	1.7577
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):	24	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.*	Stack	Probe	Filter	Exit	Aux.	Meter In	Meter Out
25	7	27	28	29	29	27	🟥	26
75	8	77	78	82	79	80	🟥	76
125	9	127	129	127	129	129	🟥	126
250	11	253	253	251				
300	11	302	306	301				
350	12	352						
400	13	402						
500	14	502						

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
60	8		60
150	9		153

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: 12/4/21

Approved by: Name: Peter Becker Signature: Date: 12/4/21

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:	MB30
Meter ID (if applicable):	XXXX
Orifice set ID:	Shop#1
Calibrated by (initials):	PB
Current 6-month calibration Yd:	0.9954
Date of 6-month calibration:	12/4/21

Date:	12/10/21
Location:	OFFICE
No. of runs (default 3)	3
Barometric pressure (in. Hg):	30.15 in. Hg
Theoretical critical vacuum:	14.22 in. Hg

Current Cal. Yd:	**0.9954**
Post-test Yd:	**0.9913**
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	13.00	729.506	737.422	7.916	XX	56	XX	58	55	0.4690	20.0	59	59	59.0
1.10	10.00	737.422	743.510	6.088	XX	58	XX	59	55	0.4690	20.0	59	59	59.0
1.10	12.00	743.510	750.814	7.304	XX	59	XX	61	55	0.4690	20.0	59	59	59.0

— SAMPLE RATE —
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
1.10	0.62
1.10	0.62
1.10	0.62

-- DRY GAS METER --
VOLUME
CORRECTED

Vm(std) (cu ft)
8.165
6.261
7.490

------ ORIFICE ------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
8.069	7.874
6.207	6.057
7.448	7.268

-- DRY GAS METER --
CALIBRATION FACTOR
Yd

Value (number)	Variation (number)
0.9882	-0.003
0.9912	0.000
0.9943	0.003

-------- ORIFICE --------
CALIBRATION FACTOR
ΔH@

Value (in H2O)	Variation (in H2O)
1.65	0.005
1.65	0.000
1.64	-0.005

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	0.9913
Average ΔH@	1.6482
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	XX	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	XX	Must be zero (meter dial stable for 1 minute)

Performed by: Name: Preston Buckley Signature________ Date: 12/10/21

Approved by: Name: Peter Becker Signature________ Date: 12/10/21

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:	**1.0236**
ΔH@:	**1.6347**

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	0.3502	23.0	59	59	59.4
0.29	39.00	338.107	349.975	11.868		62		66	40	0.2400	24.5	59	60	59.7
1.10	21.00	349.975	362.562	12.587		66		69	55	0.4690	21.0	60	60	60.0

— SAMPLE RATE —
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.61	0.463
0.29	0.317
1.10	0.620

-- DRY GAS METER --
VOLUME
CORRECTED

Vm(std) (cu ft)
5.445
12.046
12.716

——— ORIFICE ———

VOLUME CORRECTED	VOLUME NOMINAL
Vcr(std) (cu ft)	Vcr (cu ft)
5.557	5.430
12.369	12.094
13.013	12.731

– DRY GAS METER –
CALIBRATION FACTOR
Yd

Value (number)	Variation (number)
1.0206	-0.003
1.0268	0.003
1.0234	0.000

——— ORIFICE ———
CALIBRATION FACTOR
ΔH@

Value (in H2O)	Variation (in H2O)
1.635	0.000
1.645	0.011
1.624	-0.011

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	1.0236
Average ΔH@	1.6347
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
60	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: 12/4/21

Approved by: Name: Peter Becker Signature: Date: 12/4/21

Meter box 6-month calibration form (orifices) R1

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):	XXXX
Orifice set ID:	ND-40-73
Calibrated by (initials):	AG
Current 6-month calibration Yd:	1.0236
Date of 6-month calibration:	12/4/21

Date:	12/10/21
Location:	Portland
No. of runs (default 3)	3
Barometric pressure (in. Hg):	30.19 in. Hg
Theoretical critical vacuum:	14.24 in. Hg

Current Cal. Yd:	**1.0236**
Post-test Yd:	**1.0051**
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)
1.70	10.00	490.680	498.277	7.597	XX	59	XX	62	63	0.5897	20.0	58	58	58.0
1.70	10.00	498.277	505.874	7.597	XX	62	XX	63	63	0.5897	20.0	58	58	58.0
1.70	7.00	505.874	511.201	5.327	XX	63	XX	65	63	0.5897	20.0	58	58	58.0

--- SAMPLE RATE ---

INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
1.70	0.78
1.70	0.78
1.70	0.78

--- DRY GAS METER ---

VOLUME CORRECTED

Vm(std) (cu ft)
7.805
7.775
5.436

-------- ORIFICE --------

VOLUME CORRECTED	VOLUME NOMINAL
Vcr(std) (cu ft)	Vcr (cu ft)
7.822	7.608
7.822	7.608
5.476	5.326

-- DRY GAS METER --

CALIBRATION FACTOR

Yd

Value (number)	Variation (number)
1.0022	-0.003
1.0060	0.001
1.0072	0.002

------- ORIFICE -------

CALIBRATION FACTOR

ΔH@

Value (in H2O)	Variation (in H2O)
1.60	0.006
1.59	-0.001
1.59	-0.005

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	1.0051
Average ΔH@	1.5940
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

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)

Performed by: Name: Austin Goracke Signature Date: 12/10/21

Approved by: Name: Preston Bauder Signature Date: 12/10/21

Meter box post-test calibration form (orifices) R3

Critical Orifice Calibration

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	0.3078	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%

Critical Orifice Calibration

Client	MONTROSE										6/10/21	Date
Set ID	SHOP #1										in house	Job
DGM (Y) =	1.0043		Fluke ID	526		PLC	0	at	6	inH2O	0	Calibrated
DGM ID #	19461089		Std Manometer	537		NLC	0	at	22	inHg	0	QA/QC
Dry Gas Meter			Orifice ID #	40	Orifice ID #	48	Orifice ID #	55	Orifice ID #	63	Orifice ID #	73
K' Critical Orifice Coefficient				**0.23996**		**0.35024**		**0.46898**		**0.60258**		**0.82426**
	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	250.239	258.575	267.550	279.343	300.234	307.535	315.455	324.863	331.915	337.274
Final Volume	V_f	ft²	258.575	267.550	279.343	300.234	307.535	315.455	324.863	331.915	337.274	342.655
Difference	V_m	ft²	8.336	8.975	11.793	20.891	7.301	7.920	9.408	7.052	5.359	5.381
Temperatures												
Ambient	T_a	°F	80.0	82.0	82.9	83.6	83.5	84.2	84.4	83.8	84.4	84.5
Absolute ambient	T_a	°R	539.67	541.67	542.57	543.27	543.17	543.87	544.07	543.47	544.07	544.17
Initial Inlet	T_i	°F	68.9	73.3	74.3	78.5	78.9	83.9	82.6	89.1	88.5	93.8
Outlet	T_f	°F	68.7	69.9	70.9	71.6	72.5	73.3	73.8	71.7	75.4	76.1
Final Inlet	T_i	°F	73.3	74.9	78.5	80.1	83.9	84.9	89.1	89.9	93.8	94.1
Outlet	T_f	°F	69.9	70.9	71.6	82.7	73.3	73.8	71.7	75.3	76.1	76.4
Avg. Temp	T_m	°R	529.87	531.92	533.495	537.895	536.82	538.645	538.97	541.17	543.12	544.77
Time		min	27	29	26	46	12	13	12	9	5	5
		sec	0	0	0	0	0	0	0	0	0	0
			27.00	29.00	26.00	46.00	12.00	13.00	12.00	9.00	5.00	5.00
SAMPLE RATE		ACFM	0.3078	0.3095	0.4536	0.4542	0.6084	0.6092	0.7840	0.7836	1.0718	1.0762
Orifice man. rdg	dH@	in H_2O	0.31	0.31	0.70	0.70	1.30	1.30	2.20	2.20	4.30	4.30
Barometric. Pressure	Pbar	inHg	30.21	30.21	30.21	30.21	30.21	30.21	30.21	30.21	30.21	30.21
Pump vacuum		inHg	23.0	23.0	21.0	21.0	20.0	20.0	17.0	17.0	15.0	15.0
K' factor			0.2399	0.2400	0.3513	0.3491	0.4693	0.4686	0.6041	0.6010	0.8238	0.8247
K' factor Average				0.2400		0.3502		0.4690		0.6026		0.8243
% Error (+/- 0.5)		%	PASS	0.019%	PASS	0.315%	PASS	0.071%	PASS	0.260%	PASS	0.058%

Critical Orifice Calibration

Client	MONTROSE					11/22/21	Date
Set ID	ND 40-73					in house	Job
DGM (Y) =	1.0043	Fluke ID	377	PLC	0 at	6 inH2O	PB Calibrated
DGM ID #	19461089	Std Manometer	537	NLC	0 at	22 inHg	QA/QC

Dry Gas Meter			Orifice ID #	40	Orifice ID #	48	Orifice ID #	55	Orifice ID #	63	Orifice ID #	73
K' Critical Orifice Coefficient				**0.23405**		**0.33815**		**0.45212**		**0.58970**		**0.80789**
	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	496.294	509.363	515.448	525.453	534.600	540.423	546.842	553.676	559.775	564.988
Final Volume	V_f	ft²	502.334	515.448	525.453	534.600	540.423	546.842	553.676	559.775	564.988	570.211
Difference	V_m	ft²	6.040	6.085	10.005	9.147	5.823	6.419	6.834	6.099	5.213	5.223
Temperatures												
Ambient	T_a	°F	54.9	55.9	56.7	57.7	60.0	64.7	65.6	66.1	66.0	65.8
Absolute ambient	T_a	°R	514.57	515.57	519.67	517.37	519.67	524.37	525.27	525.77	525.67	525.47
Initial Inlet	T_i	°F	63.1	56.1	58.8	63.1	64.7	68.1	69.5	73.5	75.7	74.5
Outlet	T_f	°F	59.7	26.7	56.9	57.8	58.4	59.1	59.6	60.3	60.9	61.6
Final Inlet	T_i	°F	59.6	59	64.2	65.2	68.8	70	74	74.9	79.1	79.9
Outlet	T_f	°F	58.3	56.9	57.8	58.4	59	59.6	60.3	60.8	61.7	62.1
Avg. Temp	T_m	°R	519.845	509.345	519.095	520.795	522.395	523.87	525.52	527.045	529.02	529.195
Time		min	20	20	23	21	10	11	9	8	5	5
		sec	0	30	0	0	0	0	0	0	0	0
			20.00	20.50	23.00	21.00	10.00	11.00	9.00	8.00	5.00	5.00
SAMPLE RATE		ACFM	0.3078	0.2968	0.4350	0.4356	0.5823	0.5835	0.7593	0.7624	1.0426	1.0446
Orifice man. rdg	dH@	in H_2O	0.30	0.30	0.62	0.62	1.10	1.10	1.90	1.90	3.60	3.60
Barometric. Pressure	Pbar	inHg	30.13	30.13	30.13	30.13	30.13	30.13	30.13	30.13	30.13	30.13
Pump vacuum		inHg	20.0	20.0	18.0	18.0	17.0	17.0	15.0	15.0	12.0	12.0
K' factor			0.2336	0.2345	0.3389	0.3374	0.4513	0.4530	0.5892	0.5902	0.8073	0.8084
K' factor Average				0.2341		0.3381		0.4521		0.5897		0.8079
% Error (+/- 0.5)		%	PASS	0.205%	PASS	0.209%	PASS	0.191%	PASS	0.079%	PASS	0.070%

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

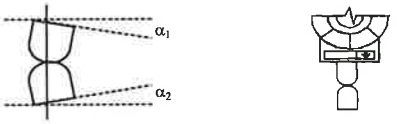
Pitot Tube Calibration Data Sheet

Calibration Date:	October 22, 2021	**Performed by:**	Max Gouveia	**Expiration Date:**	April 22, 2022
		ID No.:	5-22	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	5-22	**No damage:**	Yes
Probe Description:	Self Supporting Probe (SP)	**Effective Length (ft):**	5	**Level and Perpendicular:**	Yes
Thermocouple calibration performed?			**Thermocouple passed calibration?**		Yes

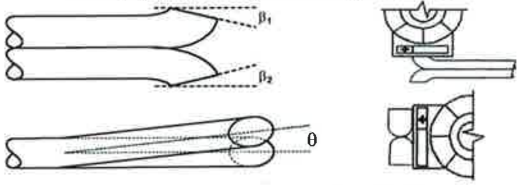
Protractor or Digital Angle Finder ID: 703
Measuring Tape ID: 720
Caliper ID: 702

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

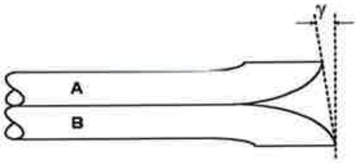


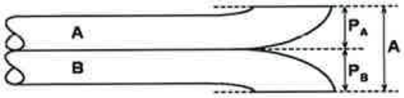
Degree indicating level position for determining α1 and α2.



Degree indicating level position for determining θ.

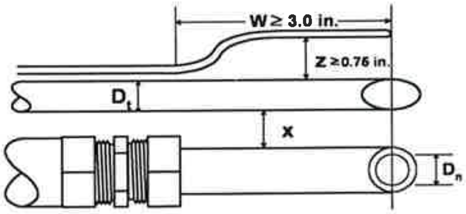
α_1 $(-10° < \alpha_1 < +10°)$	2.1	
α_2 $(-10° < \alpha_2 < +10°)$	1.7	
β_1 $(-5° < \beta_1 < +5°)$	0.3	
β_2 $(-5° < \beta_2 < +5°)$	1.0	
γ	1.2	
θ	1.8	
A	0.9256	
z= A tan γ (± 0.125")	0.0194	Pass
w= A tan θ (± 0.03125")	0.0291	Pass
D_t (0.1875" < D_t < 0.375")	0.3740	Pass
P_A (1.05D_t < P_A < 1.5D_t)	0.4628	Pass
P_B (1.05D_t < P_B < 1.5D_t)	0.4628	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	0.0000	Pass



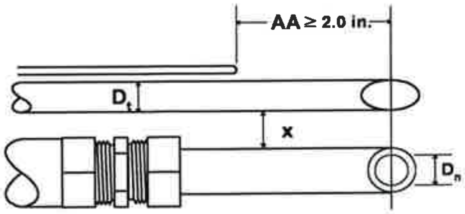


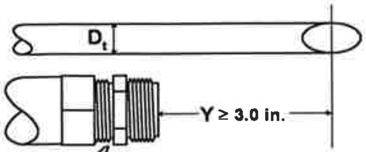
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")	7.200	Pass	Offset TC only
-or- AA (≥ 2.0")			Setback TC only
X	1.120		
D_n	0.250		
X / D_n (≥ 1.5)	5.210	Pass	
Y (≥ 3.0")	4.000	Pass	
Z ≥ 0.75"	1.000	Pass	Offset TC only





Performed By: Max Gouveia Signature: Date: 10/22/21
Approved By: Peter Becker Signature: Date: 10/22/21

MONTROSE
ENVIRONMENTAL

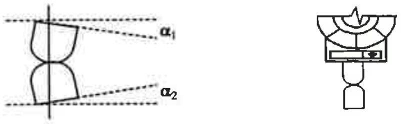
Pitot Tube Calibration Data Sheet

Calibration Date: November 18, 2021
Performed by: Preston Bauder
Expiration Date: May 18, 2022
ID No.: 6-6
No obstructions: Yes
Calibrated Pitot Tube: S-type
Probe/Pitot ID No: #N/A
No damage: Yes
Probe Description: CUSTOM (CTM)
Effective Length (ft): 6
Level and Perpendicular: Yes
Thermocouple calibration performed? Yes
Thermocouple passed calibration? Yes

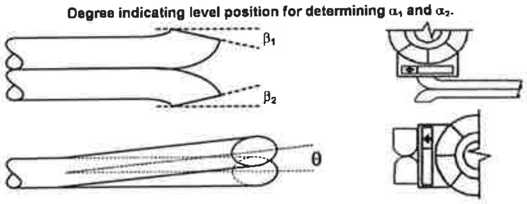
Protractor or Digital Angle Finder ID: 690
Measuring Tape ID: 1-TM-OAK
Caliper ID: 705

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

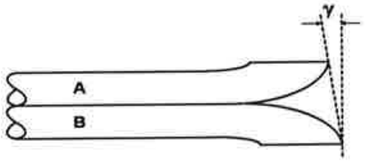


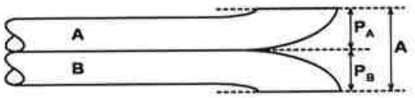
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

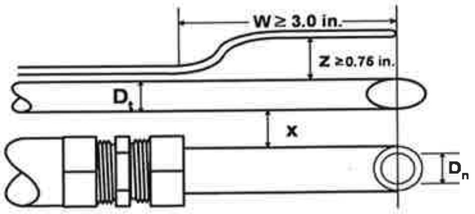
α_1 $(-10° < \alpha_1 < +10°)$	0.8	
α_2 $(-10° < \alpha_2 < +10°)$	1.0	
β_1 $(-5° < \beta_1 < +5°)$	2.3	
β_2 $(-5° < \beta_2 < +5°)$	1.5	
γ	0.2	
θ	0.7	
A	0.9250	
$z = A \tan \gamma$ (± 0.125")	0.0032	Pass
$w = A \tan \theta$ (± 0.03125")	0.0113	Pass
D_t (0.1875" < D_t < 0.375")	0.3749	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.4625	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.4625	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	0.0000	Pass



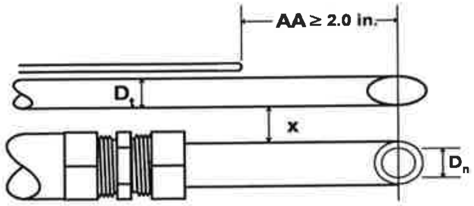


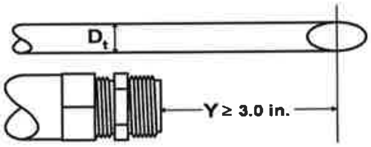
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")	4.250	Pass	Offset TC only
-or- AA (≥ 2.0")			Setback TC only
X	0.950		
D_n	0.250		
X / D_n (≥ 1.5)	3.800	Pass	
Y (≥ 3.0")	3.250	Pass	
Z ≥ 0.75"	1.250	Pass	Offset TC only





Performed By: Preston Bauder
Signature:
Date: 11/18/21

Approved By: Austin Goracke
Signature:
Date: 11/18/21

MONTROSE ENVIRONMENTAL

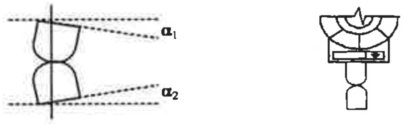
Pitot Tube Calibration Data Sheet

Calibration Date: December 4, 2021
Performed by: Julian Vaca
Expiration Date: June 4, 2022
ID No.: 6-8
No obstructions: Yes
Calibrated Pitot Tube: S-type
Probe/Pitot ID No: 6-8
No damage: Yes
Probe Description: Self Supporting Probe (SP)
Effective Length (ft): 6
Level and Perpendicular: Yes
Thermocouple calibration performed?
Thermocouple passed calibration? Yes

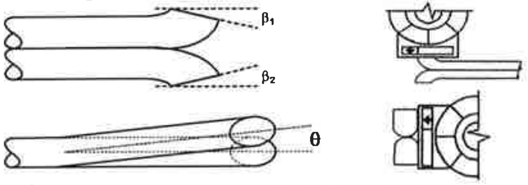
Protractor or Digital Angle Finder ID: 708
Measuring Tape ID: 720
Caliper ID: 705

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

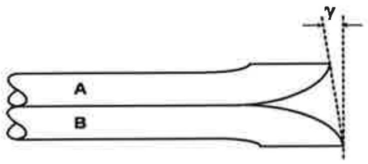


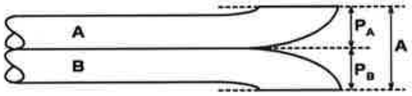
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

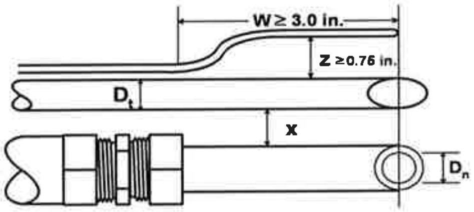
α_1 $(-10° < \alpha_1 < +10°)$	2.1	
α_2 $(-10° < \alpha_2 < +10°)$	3.3	
β_1 $(-5° < \beta_1 < +5°)$	0.5	
β_2 $(-5° < \beta_2 < +5°)$	0.3	
γ	1.1	
θ	1.6	
A	0.9640	
z= A tan γ (± 0.125")	0.0185	Pass
w= A tan θ (± 0.03125")	0.0269	Pass
D_t (0.1875" < D_t < 0.375")	0.3740	Pass
P_A (1.05D_t < P_A < 1.5D_t)	0.4870	Pass
P_B (1.05D_t < P_B < 1.5D_t)	0.4870	Pass
$\lvert P_A - P_B \rvert \le 0.0625$	0.0000	Pass



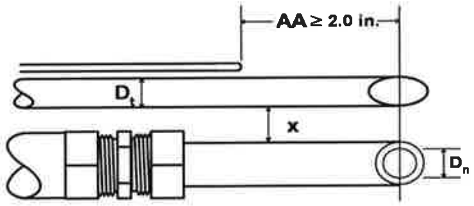


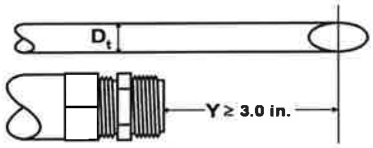
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")			Offset TC only
-or- AA (≥ 2.0")	2.053	Pass	Setback TC only
X	1.437		
D_n	0.373		
X / D_n (≥ 1.5)	3.853	Pass	
Y (≥ 3.0")	3.104	Pass	
Z ≥ 0.75"			Offset TC only





Performed By: Julian Vaca
Signature: Julian Vaca
Date: 12/4/21
Approved By: Peter Bee
Signature: Peter Bee
Date: 12/4/21

ilac-MRA

ACCREDITED
A2LA Certificate No. 1750.01
Calibration

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4371-12034579

Traceable® Certificate of Calibration for Lollipop Thermometer

Manufactured for and distributed by : Thomas Scientific Box 99,99 High Hill Road,Swedeboro,NJ,08085-0099,U.S.A.

Instrument Identification:

Model: 1235D23,

S/N: 210187011

Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath	A73332		
Temperature Calibration Bath	B3A444		
Thermistor Module	B96381	21 Aug 2021	1000457544
Temperature Probe	5392	04 Aug 2021	C0804052
Temperature Probe	5398	04 Aug 2021	C0804051

Certificate Information:

Technician: 420

Procedure: CAL-03

Cal Date: 09 Mar 2021

Cal Due Date: 09 Mar 2023

Test Conditions: 54.91%RH 22.53°C 1026mBar

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	0.0	Y	-1	1	0.058	>4:1
°C	N.A.	N.A.		100.00	100.2	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 Lollipop Thermometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Lollipop Thermometer 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 : 09 Mar 2021

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: 12/07/21

Time: 07:21

Data By: Becker

Reference: http://forecast.weather.gov/MapClick.php?CityName=Orange&state

Reference Barometer ID	**Salem - McNary Field (KSLE)**
Reference Barometer Location	Lat: 44.90493 Lon: 123.00096 Elev: 207
Reference Barometer Other Info.	Last Update on Dec 7 06:56 PDT
Reference Barometer Indication, corrected to sea level	**30.02**
Reference Barometer Reference Elevation	**207**
Reference Barometer Actual Pressure	29.81
Test Barometer Location/Site	**Brooks, OR**
Location/Site Elevation	**184**
Location/Site Barometric Pressure	29.84
Sampling Location Height (above/below site elevation)	**120**
Sampling Location Barometric Pressure	**29.72**

Appendix D.3
Instrumental Test Method QA/QC Data

MONTROSE
AIR QUALITY SERVICES

CEMS CONFIGURATION DATA

Project Information

Client / Facility Covanta Marion, Inc
Project No. PROJ-010935
Source / Location Unit 1 : Unit 2
Method(s) EPA 3A
Test Dates 12.8 / 12.7.2021
Project Manager / Team (initials) Peter B / Sebastian W. Austin G. Preston B, Escha C Lester W

Analyzers In Service

Please circle all applicable [✓ O₂] [✓ CO₂] CO NOₓ SO₂ TRS THC

Response Time (seconds) 57 57

Filtration (circle)

Filter Type In-Stack [✓ Out-of-Stack] Sintered Other

Filter Material [✓ Glass] Quartz Steel N/A Other

Sample Probe (circle)

Length 4' [✓ 6'] 8' 10' 12' 14' Other

Material [✓ Steel] Glass Teflon Titanium Quartz Inconel Other

Heated Yes [✓ No]

Probe Temperature ____ °F [✓ N/A]

Conditioner / Moisture Knock-Out (circle)

In Use? [✓ Yes] No

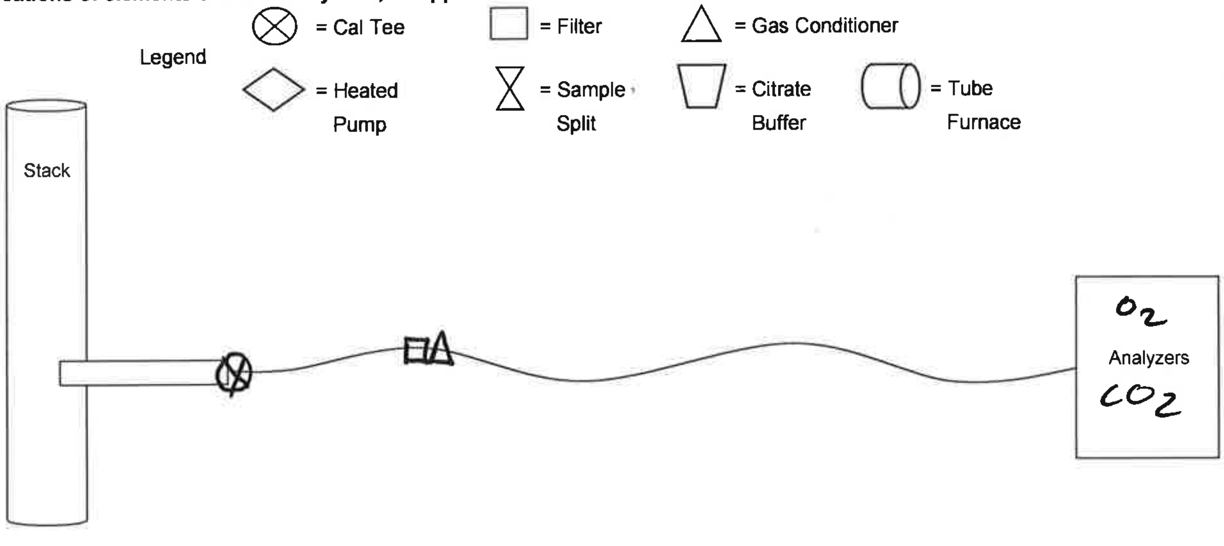
Coolant [✓ Ice and Water] Anti-Freeze Electric Other

Trap Material [✓ Steel] Glass Teflon Other

Leak Checks

	12.7.21 (Acute) unit 1	12.8.2021 (Chronic) Unit 2
Pre-Test	0.00 cfh @ 25.0 in. Hg	0.00 cfh @ 25.0 in. Hg
Post-Test	0.00 cfh @ 24.0 in. Hg	0.00 cfh @ 25.0 in. Hg
System Flow Rate	4.0 cfh	4.0 cfh
Leak Rate Post-Test (cfh) / System Flow Rate (cfh) * 100 =	0.00 %	0.00 %

Fill in locations of elements of the CEM system, as applicable



Upstream of conditioner
Sample Line Length 10 feet
Sample Line Material teflon
Sample Line Temp. N/A deg. F

Downstream of conditioner
Sample Line Length 240 feet
Sample Line Material Teflon
Sample Line Temp. N/A deg. F

If this information is not accurate for all runs, note exceptions here.

CEMS Config Data Sheet - R0

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:	E03NI80E15A0138	Reference Number:	153-401899133-1
Cylinder Number:	EB0063296	Cylinder Volume:	150.9 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72020	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Sep 09, 2020

Expiration Date: Sep 09, 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
CARBON DIOXIDE	10.00 %	9.923 %	G1	+/- 0.7% NIST Traceable	09/09/2020
OXYGEN	10.00 %	10.19 %	G1	+/- 0.8% NIST Traceable	09/09/2020
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060802	CC411741	13.359 % CARBON DIOXIDE/NITROGEN	0.6%	May 14, 2025
NTRM	98051017	SG9142416BAL	12.05 % OXYGEN/NITROGEN	0.7%	Dec 14, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Sep 03, 2020
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Aug 13, 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:	E03NI54E15A3808	Reference Number:	153-401795443-1
Cylinder Number:	EB0089025	Cylinder Volume:	162.7 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72020	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Apr 24, 2020

Expiration Date: Apr 24, 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
CARBON DIOXIDE	23.00 %	22.66 %	G1	+/- 0.6% NIST Traceable	04/24/2020
OXYGEN	23.00 %	23.04 %	G1	+/- 0.5% NIST Traceable	04/24/2020
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06011806	K012669	23.04 % CARBON DIOXIDE/NITROGEN	0.5%	Jun 27, 2022
NTRM	09061437	CC282504	22.53 % OXYGEN/NITROGEN	0.4%	May 13, 2025

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Apr 16, 2020
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Apr 23, 2020

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 BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	153-402123430-1
Cylinder Analyzed:	CC354839	Cylinder Volume:	142.0 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2000 PSIG
Analysis Date:	May 24, 2021	Valve Outlet:	580
Lot Number:	153-402123430-1		

Expiration Date: May 24, 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

Cylinders in Batch:

AL-056690, ALM-032447, CC145555, CC195483, CC278729, CC324005@, CC330387, CC354839, CC359274, CC437211, CC476262, CC476263, CC476331, CC484024, CC486067, CC487419, CC505121, CC710013, CC733388, CC734799, CC734808, CC741580, EB0086922, EB0091079, EB0095899, EB0122799, EB0122834, SG9140146BAL, SG9146460BAL, SG9197151BAL, XC002298B

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

Signature on file

Approved for Release

INTERFERENCE RESPONSE TEST

Date of Test: 2/7/2018 Name: Sleight Halley
Analyzer: Type / Model: NO_x, O_2 / CAI 700 Series
Serial Number: 92/ PN # 1712003

Method Referenced: EPA Method 7E

NO_x Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response ppmv	Interference % of Span (127.0 ppmv)
SO_2	50.59	-0.1	0.08
O_2	21.1	-0.1	0.08
CO	24.21	-0.1	0.08
CO_2	19.43	-0.1	0.08
CH_4	909	-0.1	0.08

A Calibration Cylinder containing 127.0 ppm NO_x was used to calibrate the analyzer.

Results:

Test Gas	Sum of Absolute Differences	Sum of Individual Gases % Interferences	Max Allowable Percent of Span Interference (%)
NO_x	0.5	0.4	2.5

O_2 Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response %	Interference % of Span (21.1%)
SO_2	50.59	0.01	0.00
CO_2	19.43 / 5.05 O_2	4.97	0.38
CO.	24.21	-0.01	0.00
NO	126.2	-0.01	0.00
NO_2	50.15	0.12	0.57
CH_4	909 / 20.95 O_2	20.95	0.00

A Calibration Cylinder containing 21.1% Oxygen was used to Span Analyzer.

Results:

Test Gas	Sum of Absolute Differences	Sum of Individual Gases % Interferences	Max Allowable Percent of Span Interference (%)
O_2	0.20	0.95	2.5

MONTROSE
AIR QUALITY SERVICES

INTERFERENCE RESPONSE TEST

Date of Test: 12/5/17 Name: Brett Sherwood
Analyzer: Type / Model: O2/CO2 CAI 700 HE# 741
Serial Number: 1708026

Method Referenced: EPA Method 7E

O_2 Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response %	Interference % of Span (21.42 %)
SO_2	490.2	0.01	0.04
CO_2	19.52	0.02	0.09
NO	475.5	-0.01	0.04
NO_2	50.08	0.13	0.61
H_2	40	0.21	0.98
CO	445.3	0.04	0.19

A Calibration Cylinder containing 21.42% 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 (%)
0.42	1.95	2.5

O_2 Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response %	Interference % of Span (19.52 %)
SO_2	490.2	0.00	0.0
CO_2	4.945	0.00	0.0
NO	475.5	0.00	0.0
NO_2	50.08	0.00	0.0
H_2	40	0.00	0.0
CO	445.3	0.02	0.01

A Calibration Cylinder containing 19.52% 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 (%)
0.02	0.01	2.5

Appendix D.4
Accreditation Information/Certifications

STACK TESTING ACCREDITATION COUNCIL

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 11th day of February 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3925.01
Valid to February 28, 2022

A2LA
1978

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

CERTIFICATE OF COMPLETION

Peter Becker

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: 011-2017-10

Tate Strickler, Accreditation Director

DATE OF ISSUE: 8/4/17

DATE OF EXPIRATION: 8/4/22

MONTROSE
ENVIRONMENTAL

CERTIFICATE OF COMPLETION

Peter Becker

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 2: *EPA Manual Gaseous Pollutants Source Sampling Methods*

Certificate Number: 006-2020-46

Tate Strickler, VP – Quality Systems

DATE OF ISSUE: 5/29/20

DATE OF EXPIRATION: 5/28/25

MONTROSE
ENVIRONMENTAL

CERTIFICATE OF COMPLETION

Peter Becker

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: 006-2020-24

Tate Strickler, Accreditation Director

DATE OF ISSUE: 2/12/20

DATE OF EXPIRATION: 2/12/25

MONTROSE
ENVIRONMENTAL

CERTIFICATE OF COMPLETION

Peter Becker

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 4: *EPA Hazardous Metals Measurement Methods*

Certificate Number: 006-2020-47

Tate Strickler, VP – Quality Systems

DATE OF ISSUE: 7/22/20

DATE OF EXPIRATION: 7/21/25

MONTROSE ENVIRONMENTAL

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

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[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

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[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

December 3, 2021

Andrew Willis
Covanta Marion, Inc.
4850 Brooklake Road NE
Brooks, OR 97305

Mr. Willis,

DEQ has reviewed the revised source test plan submitted by Covanta Marion, Inc. (CMI) on November 8, 2021. Based on this review, DEQ approves the source test plan with the following comments.

General Comments

1. DEQ will require that data used for CAO risk assessment purposes result from source tests conducted under typical worst-case conditions that generate the highest emissions. Consistent with DEQ's Source Sampling Manual, it will be imperative to describe in detail the proposed process conditions that generate such "worst-case conditions". Because the facility accepts and burns a wide variety of materials (municipal solid waste, regulated medical waste, industrial solid waste, special waste, liquid), multiple source testing events may be required for DEQ to understand the facility's range of toxic air contaminant emissions and approve a risk assessment that covers the broad range of operational conditions.
2. Only regular operating staff may adjust the production process and emission control parameters during the source performance tests and within two (2) hours prior to the tests. Any operating adjustments made during the source performance tests, which are a result of consultation during the tests with source testing personnel, equipment vendors or consultants, may render the source performance test invalid.
3. DEQ must be notified of any changes in the source test plan and/or the specified methods prior to testing. Significant changes not acknowledged by DEQ could be the basis for invalidating a test run and potentially the entire testing program. Documentation of any deviations must include an evaluation of the impact of the deviation on the test data.
4. It is acceptable to postpone a scheduled test or suspend a test in progress if the discontinuation is due to equipment failure beyond the facility's control, construction delays beyond the facility's control, severe meteorological conditions, and situations that would jeopardize the safety of the testing contractors and/or operators. If the test is underway, the permittee must make every effort to complete the test run. If the test run cannot be finished the sample must still be analyzed and results must be included in the test report unless written permission is received from DEQ stating otherwise. All recoverable test information(process & sample data) must be included in the test report along with a detailed explanation of why the test run could not be finished. Covanta may include discussions regarding the validity of such test runs and DEQ will determine if a run is valid.

   It is unacceptable to postpone or suspend a test run in progress if it is discontinued because the source is not able to comply with an emission limit or verify an emission factor.

Specific Comments

1. Upon review of annual steam data, high-fire testing steam rate must be greater than or equal to 67 klbs/hr.
2. EPA Method 5/26A must be sampled isokinetically if used for analysis of particulate matter (MoO3).
3. Analysis for chloride, total metals, and total halogenated organics must be completed on the liquid that is used for Liquid Direct Injection (LDI).
4. Supplemental natural gas fuel (if used) will be reported as scf.

Approved Deviations

1. DEQ approves the requested EPA Method 0061 deviation to use 0.1M sodium bicarbonate as the impinger solution in place of 0.1M KOH.
2. DEQ approves the requested CARB Method 430 deviation to use a calibrated dry gas meter in place of a rotameter.
3. DEQ approves the requested CARB Method 430 deviation to use a toluene "float" in the DNPH impingers to capture acrolein and to prevent interference from NOx.
4. DEQ approves the requested EPA Method 26A deviation for constant rate sampling only for halogens and hydrogen halides.

Any further modifications and/or alternatives to testing methods or procedures that are implemented to satisfy DEQ testing requirements must receive approval from DEQ prior to their use in the field. Changes not acknowledged by the DEQ could be the basis for invalidating an entire test run and potentially the entire testing program.

The DEQ extension request approval letter dated June 23, 2021 requires source testing to be completed by December 31, 2021. DEQ recognizes the unique challenges this testing pose to your facility and operations, and the results will provide valuable information for completing the risk assessment. If you have any questions or concerns, please contact me directly at (503) 229-5534 or thomas.rhodes@deq.state.or.us. Thank you for your continued efforts with this process.

Sincerely,

Thomas Rhodes

Thomas Rhodes
DEQ CAO Source Test Coordinator

Cc: Jeffery Hahn, Covanta Marion, Inc.
Kirk Little, Covanta Marion, Inc.
Keith Johnson, DEQ
Kenzie Billings, DEQ
Claudia Davis, DEQ
Michael Eisele, DEQ
File

24-5398 Covanta Marion, Inc.

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

December 14, 2021

Andrew Willis
Covanta Marion, Inc.
4850 Brookdale Rd. NE
Brooks, OR 97305

Re: Request for Extension Pursuant to OAR 340-245-0030(3) for Completion of Cleaner Air Oregon Air Toxics Test Program

Mr. Willis,

On December 3, 2021, DEQ approved Covanta Marion, Inc.'s (CMI) source test plan (test plan) for testing scheduled for December 7-9, 2021. This test plan included a requirement that CMI complete testing with minimum liquid injection rates of 3 gallons per minute and 3.75 gallons per minute of leachate from the Marion County monofill during sampling of the stack emissions for high fire and low fire operating scenarios, respectively.

Testing was performed on December 7-8, 2021 while injecting the minimum proposed leachate rate. However, on December 7, 2021, CMI was informed that two pumps used to transfer leachate from the Marion County monofill's onsite storage lagoon into tankers for delivery to CMI had failed. Furthermore, CMI was informed that leachate delivery to the Marion facility would not resume until the new year (2022).

CMI provided a status update of which testing was completed and which testing was pending in the December 8, 2021 extension request. At least two additional days of testing are required to fulfill Cleaner Air Oregon (CAO) source testing requirements. Based on source testing contractor availability, and conditions proposed in the approved testing plan, CMI requested to extend the date by which CAO source testing must be completed to April 30, 2022.

DEQ will allow CMI to complete source testing by no later than March 31, 2022. The source test report for this testing must be submitted within 60 days of the completion of testing. An updated testing schedule to the approved source test plan must be submitted at least 30 days prior to testing.

In regards to the testing that was completed successfully on December 7-8, 2021, a source test report must be submitted to DEQ by February 6, 2022 as required in DEQ's March 11, 2021 letter. DEQ encourages CMI to complete source testing as soon as is feasible. Please contact me directly at 503.229.5247, billings.kenzie@deq.state.or.us if you have any questions regarding this extension.

Sincerely,

Kenzie Billings, P.E.
Air Toxics Project Manager

Cc: Terry Coble, CMI
Jeffrey Hahn, CMI
Kirk Little, CMI
Gary Pierce, CMI
Claudia Davis, DEQ
Mike Eisele, DEQ
J.R. Giska, DEQ
Keith Johnson, DEQ
Thomas Rhodes, DEQ
File

Covanta Marion, Inc.
A Covanta Energy Company
PO Box 9126
4850 Brooklake Road NE
Brooks, OR 97305
Tel: (503) 393-0890
Fax: (503) 393-0890

COVANTA
Powering Today. Protecting Tomorrow.

SOURCE TEST PLAN - COV REPORT NO. 4503

Revised November 24, 2021

Source Information

Facility:	Covanta Marion, Inc. 4850 Brooklake Road, N.E. Brooks, OR 97305
Purpose of Test:	To conduct source sampling for specific reportable Toxic Air Contaminants (TAC) included under OAR 340-245-8020 for the purposes of generating a representative emissions inventory pursuant to OAR 340-245-0040 for the Cleaner Air Oregon (CAO) program.
Person(s) to Contact:	Mr. Kirk Little, Facility Manager (503) 393-0890 Mr. Paul Kantola Director, Environmental Compliance Testing (862) 591-9087

Testing Information

Procedure:	Testing two (2) municipal solid waste-fired boilers for specific toxic air contaminants.
Proposed Test Dates:	December 7 – 9, 2021

Certification Statement

Statement of Certification: *Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete. I also certify that all statements made concerning compliance, which are based on monitoring required by the permit but not required to be submitted to the Department, are true, accurate and complete based on information and belief formed after reasonable inquiry.*

Kirk Little	Facility Manager
Name of Designated Responsible Official	Title of Responsible Official
Signature of Responsible Official	Date (mm/dd/yy)

Testing Firm Information

Company: Montrose Air Quality Services, LLC
Address: 13585 NE Whitaker Way Portland, OR 97230
Project Manager: Peter Becker
Email: pbecker@montrose-env.com
Phone Number: 330-285-6884
Field Chemist: Esha Chetty
Report Writer: Andy Vella

Lab Information

Emission Parameter	**Analytical Lab**
Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), Hydrogen Bromide (HBr), Chloride (Cl_2), and Bromide (Br)	Enthalpy Analytical, Durham, NC (Montrose)
Multimetals (MMTL), plus Al, Fe, Mo, K and V	Enthalpy Analytical, Durham, NC (Montrose)
Fraction of Mo that is MoO_3	MVA Scientific, Duluth GA
Dioxins/Furans (PCDD/PCDF), Polychlorinated Biphenyls (PCB), Chlorobenzene and Chlorophenols	Vista Analytical, El Dorado Hills CA (Montrose) Vista Analytical, El Dorado Hills CA (Montrose) Enthalpy Analytical, Wilmington and Durham NC (Montrose)
Polycyclic Aromatic Hydrocarbons (PAH)	Vista Analytical, El Dorado Hills CA (Montrose)
Hexavalent Chromium	Chester LabNet, Tigard, OR
Ammonia	Montrose Air Quality Services, Antioch, CA
Formaldehyde, acetaldehyde, acrolein	Atmospheric Analysis & Consulting, Ventura, CA
Volatile Organic Compounds (VOC) and VOC-derivatives	Eurofins Test America, Knoxville TN

TABLE OF CONTENTS

1.0 INTRODUCTION

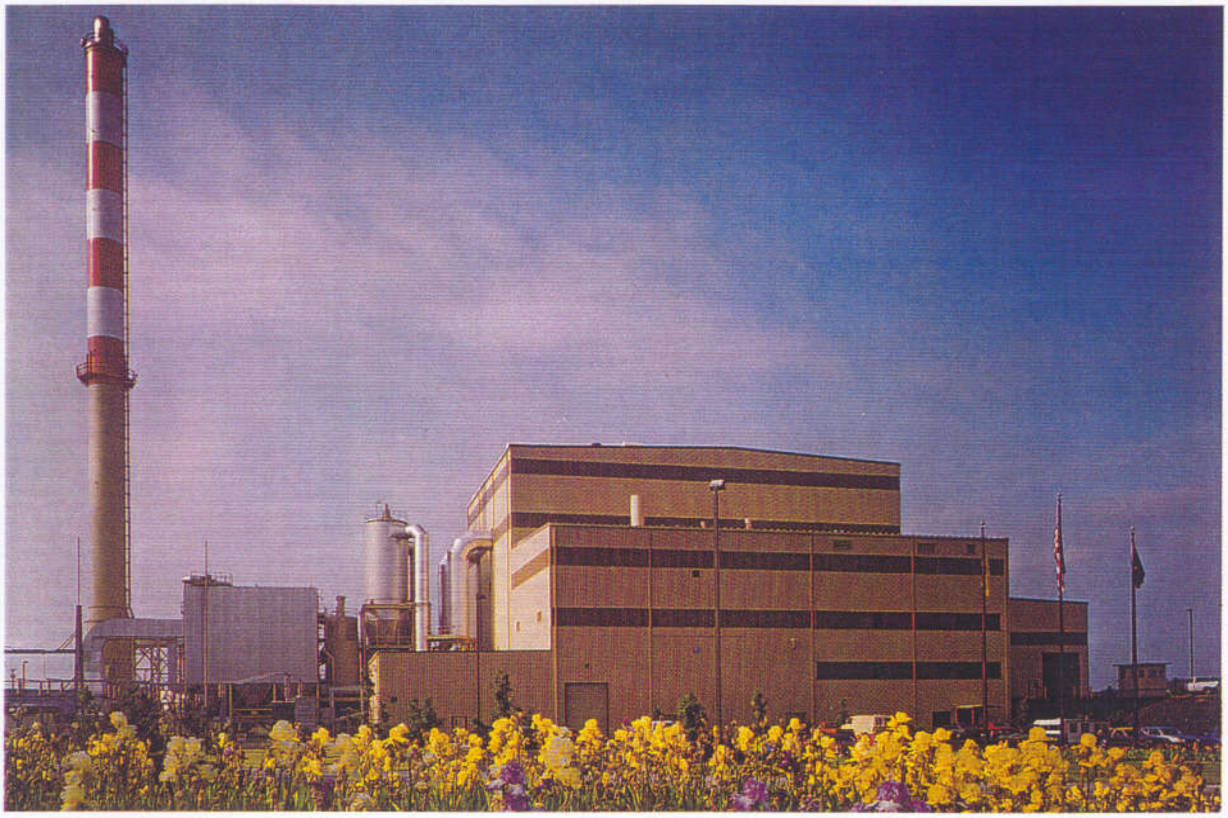
A contractor for Covanta Marion, Inc. (CMI) will test various air emissions of the CMI Municipal Solid Energy-From-Waste Facility. This testing is being conducted to fulfill requirements of the Cleaner Air Oregon (CAO) program pursuant to OAR 340-245-0040(1). Results from this testing will be used for the purpose of CAO compliance and not for demonstrating compliance with Covanta's Title V source testing requirements as applicable in conditions 35 through 44 of CMI's Title V permit. The Oregon Department of Environmental Quality (DEQ) Source Sampling Manual identifies specific conditions that must be met for compliance testing. It should be noted that not all conditions will be met for the purpose of the CAO testing. The test is scheduled for the week of December 5, 2021. Source testing for CAO may be performed on either a single municipal waste combustor (MWC) or both MWC's. It is presumed that test results obtained from one unit will be representative of the other unit.

During acute toxicity testing for metal and acid gases at a reduced load, every effort will be made to replicate a regulated medical waste (RMW) processing rate that is representative of a daily maximum of approximately 75 tons, which is slightly more than 3 tons/hr. CMI will not deviate from operating conditions that would risk non-compliance with the provisions of our Title V permit. Should such an event arise, the priority will be to mitigate the environmental upset, which may require altering operating conditions, such as utilizing auxiliary burners as necessary to stabilize combustion conditions. Individual test runs may or may not continue depending on the nature of the event. All such instances will be documented and reported to include at a minimum, a description of the event, what operational changes were made (if any), and whether testing was paused, continued or terminated.

2.0 DESCRIPTION OF OPERATIONS

Covanta Marion, Inc.

Brooks, Oregon



The Marion County Solid Waste-to-Energy Facility began commercial operation in March 1987, servicing the solid waste management needs of the more than 270,000 people of Marion County. The facility processes 550 tons per day of solid waste, which generates up to 13.1 megawatts of renewable energy that is sold to Portland General Electric. The Marion facility was the first mass burn waterwall resource recovery facility burning municipal solid waste in the United States to use dry flue gas scrubbers and fabric filter baghouses to control acid gases and particulates. In addition to municipal solid waste, Marion processes about 90 tons per month of supplemental waste including non-hazardous medical waste. The facility is located in Brooks, a small farming community about four miles north of Salem, the state capital, and 40 miles south of Portland.

The Marion County
Solid Waste-to-Energy Facility

COVANTA
ENERGY

Covanta Marion, Inc.

Recycling Waste Into Energy

The facility's mass burn combustion system incorporates the technology of German-based Martin GmbH. Waste is combusted at furnace temperatures exceeding 1,800 degrees Fahrenheit and reduced to an inert ash residue which is approximately 10% of its original volume; combustion ash is disposed of in a specially lined ash monofill which is owned and operated by the County and located about 10 miles north of the facility. Before leaving the facility, combustion air is directed through technologically advanced air pollution control equipment, including dry flue gas scrubbers and fabric filter baghouses.

An Integrated System

The Marion County Solid Waste-to-Energy Facility is the cornerstone of the County's integrated waste management system. In addition to converting waste into energy, the County provides curbside pick-up of recyclable materials such as metals, glass and newspaper. The County also runs a drop-off program for collection of yard waste; these organic materials are then composted and used in agricultural applications. Ferrous metal recovered from combustion ash is also a major contributor to the County's recycling efforts. A unique feature of the County's integrated system is its state-of-the-art ash monofill and leachate system. Leachate from the ash monofill is treated through a vacuum distillation process and clean drinking-quality water is discharged.

The Marion County Solid Waste-to-Energy Facility is located in Brooks, about 4 miles north of Salem. For information or to arrange a tour, please call 503-393-0890.

Facility Specifications

Rated Refuse Combustion Capacity
550 tons per day

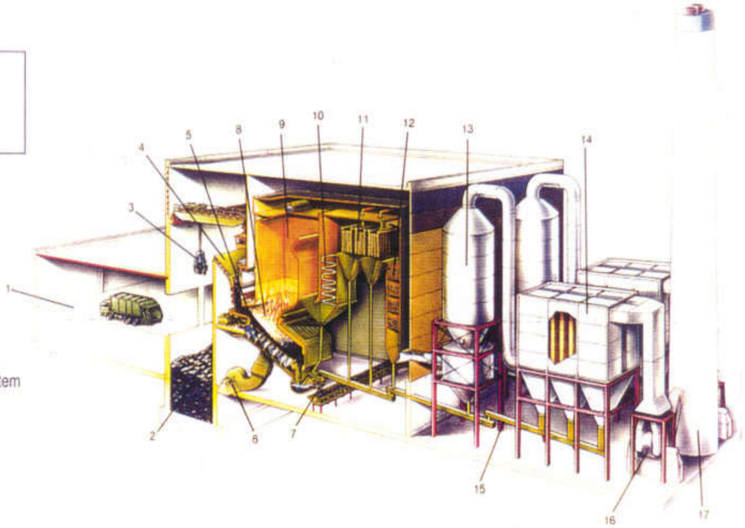
Unit Design
Two 275 ton-per-day waterwall furnaces

Guaranteed Throughput
170,000 tons per year

Guaranteed Waste Delivery
145,000 tons per year

Energy Generation at Rated Capacity
Up to 13.1 MW, sold to Portland General Electric Company

A Typical COVANTA Waste-to-Energy Facility



1. Tipping Floor
2. Refuse Holding Pit
3. Grapple Feed Chute
4. Feed Chute
5. Martin Stoker Grate
6. Combustion Air Fan
7. Martin Ash Discharger
8. Combustion Chamber
9. Radiant Zone (furnace)
10. Convection Zone
11. Superheater
12. Economizer
13. Dry Gas Scrubber
14. Baghouse
15. Fly Ash Handling System
16. Induced Draft Air Fan
17. Stack

Refuse collection trucks are weighed at the scalehouse and monitored for safety. Once cleared, they enter the tipping building and dump their waste into the storage pit. An overhead crane mixes the waste in the pit and lifts the waste up into a feed chute leading to the furnace. From the feed chute, waste is pushed by hydraulic ram feeders onto a stoker grate. The MARTIN Reverse-Reciprocating Stoker is sloped downward and is composed of alternate rows of fixed and moving grate bars. The grate bars push upward against the natural downward movement of the waste bed. This constant movement ensures that the burning waste is continually agitated and pushed back, thus serving as underfire for freshly-fed waste. A forced draft fan supplies the primary combustion air underneath the grate. In addition, overfire air is injected through the front and rear walls of the furnace.

Inside the steel tubes that form the furnace walls and the boiler, heat from the combustion process converts water to steam. The superheater further heats the steam before it is sent to a turbine generator to produce electricity. After passing through the boiler sections, the hot combustion gases are used to preheat boiler feedwater in the economizer.

While the combustion gases move through the boiler, the bottom ash slowly makes its way to the end of the grate where it falls into the water quench trough of the Martin Ash Discharger. From the boiler, the cooled gases enter the advanced air pollution control system. Using the lime slurry, the dry scrubber neutralizes any acid-forming gases, such as sulfur oxides and hydrogen chloride.

As the gas stream travels through these filter devices, more than 99 percent of particulate matter is removed. Captured fly ash particles fall into hoppers and are transported by an enclosed conveyor system to the Martin Ash Discharger where they are wetted to prevent dust, and mixed with the bottom ash from the grate. The ash residue is then conveyed to an enclosed building where it is loaded into trucks and taken to a landfill designed to protect against groundwater contamination. Ash residue from the furnace can be processed for removal of recyclable scrap iron.

All aspects of the plant's operation are monitored from the central control room 24 hours a day, seven days a week, 365 days a year.

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Covanta Marion, Inc.
4850 Brooklake Road,
Brooks, OR 97305
503-393-0890

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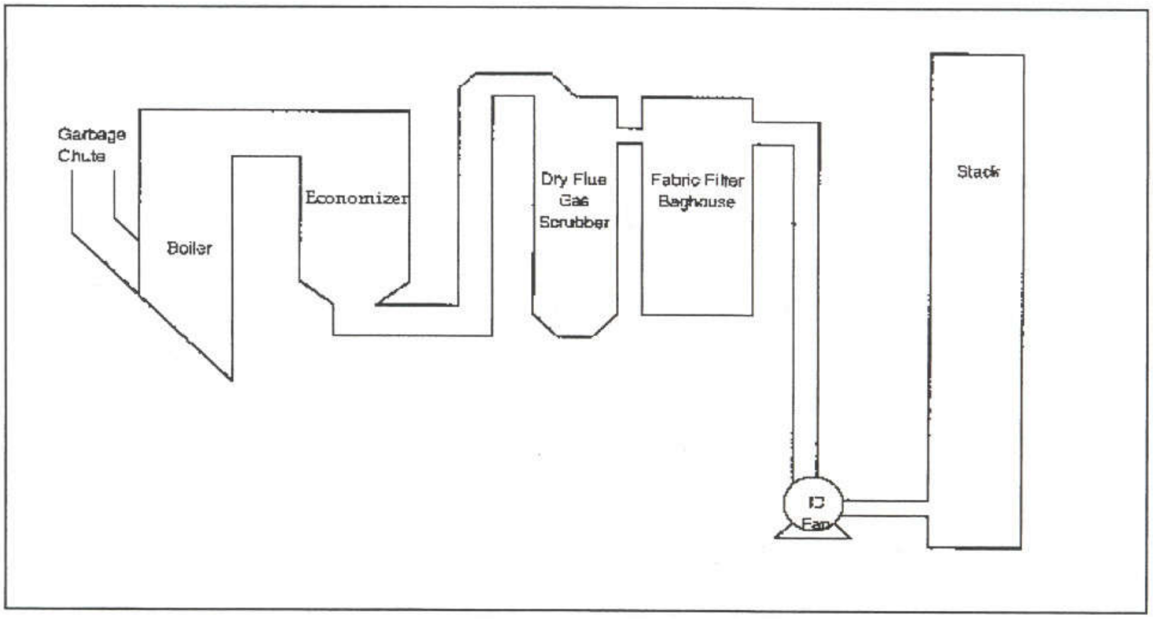
2.2 Flow Diagram of Process



The Marion County Solid Waste-to-Energy Facility is located in Brooks, Oregon. The facility consists of two identical municipal solid waste-fired boilers of Martin GmbH Stoker Combustion System design. The combustors each have a capacity greater than 250 tons per day. The facility produces up to 13.1 MW of electricity daily. Each MWC unit exhausts through a common flue stack. Air pollution equipment for each independent train includes semi-dry flue gas scrubbers for acid gas control, fabric filter for particulate removal, selective non-catalytic reduction (SNCR) for control of nitrogen oxides and dry activated carbon injection for mercury emission controls. Each unit is also equipped with a continuous emission monitoring system to provide feedback on the effectiveness of the air pollution control (APC) equipment.

2.3 OPERATING CONDITIONS

CMI will conduct testing under two distinct operating scenarios which include:

- a low fire/reduced steam load (80-90% of design steam load) to provide results used in calculation of acute health risk, and
- a high fire/increased steam load (90-110% of design steam load) to characterize chronic health risk.

Design steam load capacity is approximately 67 Klbs/hr. A summary detailing which test methods will be conducted under each scenario can be found in Sections 3.1 and 3.2. CMI will test under 'worst case' conditions (refer to operating scenarios referenced above) for the Cleaner Air Oregon required testing, as described in detail in Section 2.9 of the DEQ Source Sampling Manual, i.e., both the low fire/reduced steam load and the high fire/increased steam load operating scenarios.

Since the "high fire/increased steam load" operating scenario includes a significant portion of the operating hours in a year for each boiler, the testing program found in Section 3.1 will adequately address the chronic cancer and non-cancer health effects in an HRA prepared using those test results, which will also include the startup and shutdown dioxin/furan and HCl results obtained during ODEQ approved testing at CMI earlier this year.

The testing of those toxic air contaminants that typically comprise the majority of the chronic cancer and non-cancer health effects in an HRA will include: PCDD/F's, PCB's, PAH's, VOC's, Metals, Acid gases (including all halides and halogens), Ammonia, Formaldehyde and other aldehydes, Chlorophenols and Chlorobenzenes. These will be tested as discussed in Section 3.1.

The "low fire/reduced steam load" scenario, which represents the maximum "worst case" boiler operating condition, would only occur in a few hours of operation in any given year. Only those components of an HRA that could affect an acute health risk are included in the testing program found in Section 3.2.

Thus, for the testing in Section 3.2, the acid gases (including all halides and halogens) and metals, which typically comprise more than 95% of the acute health risk in an HRA, will be tested as shown in Section 3.2.

The fuel processed during testing will primarily consist of municipal solid waste and other approved wastes (e.g., regulated medical waste, industrial solid wastes). CMI will track the amounts of regulated medical waste and industrial waste that is received during each testing day. CMI will not operate under any process state that may jeopardize compliance with any condition of the Title V permit. In the event that the Continuous Emissions Monitoring System (CEMS), Continuous Opacity Monitoring System (COMS), or other Parametric Monitoring System indicate that an emission or air pollution control device parameter is at or near a permitted limit, CMI will adjust operating conditions accordingly in order to ensure continuous compliance.

The two operating conditions for the two scenarios will include:

a) High fire
   I. Minimum steam load (Klbs/hr) ≥ 90% of design or ~60 Klbs/hr
   II. Minimum rate of regulated medical waste per unit (tons/hr) = 1.5
   III. Minimum rate of liquid direct injection per unit (gal/hr) = 180
   IV. Wastes deliveries during the days of testing will be quantified and listed in the source test report.

b) Low Fire
   I. Maximum steam load (Klbs/hr) ≤ 90% of design or ~60 Klbs
   II. Minimum rate of regulated medical waste (tons/hr) = 1.5
   III. Minimum rate of liquid direct injection (gal/hr) = 225
   IV. Waste deliveries during the days of testing will be quantified and listed in the source test report.

3.0 SOURCE TEST INFORMATION

3.0 SOURCE TEST INFORMATION

3.1 EMISSION TEST PARAMETERS – CHRONIC TOXICITY TESTING SCENARIO

Emission Parameter	Sampling Method	Location	Unit No.	Replicates	Approximate Sampling Time (Min)
Dioxins/Furans (PCDD/PCDF), Polychlorinated Biphenyls (PCB)	U.S. EPA Method 23	Stack	1	1, 2, 3	240
Chlorobenzenes, and Chlorophenols	U.S. EPA SW-846 0023	Stack	1	1, 2, 3	240
Polycyclic Aromatic Hydrocarbons (PAH)	CARB Method 429	Stack	1	1, 2, 3	240
Volatile Organic Compounds (VOC) and VOC-derivatives	U.S. EPA SW-846 0031	Stack	1	1, 2, 3	40x3 per run
Formaldehyde, acetaldehyde, acrolein	CARB 430	Stack	2	1, 2, 3	60
Ammonia	BAAQMD ST-1B	Stack	2	1, 2, 3	60
Multimetals (MMTL), plus Al, Fe, Mo, K and V (1)	U.S. EPA Method 29	Stack	2	1, 2, 3	120
Hexavalent Chromium (2)	U.S. EPA SW-846 0061	Stack	2	1, 2, 3	120
Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), Hydrogen Bromide (HBr), Chloride (Cl_2), and Bromide (Br)	U.S. EPA Method 26A (Modified)	Stack	1	1, 2, 3	60

(1) The Molybdenum compounds on the filter will be analyzed using scanning electron microscopy with energy dispersive X-ray spectrometry from the filter used in EPA Method 29.

(2) Hexavalent chromium testing will follow EPA SW-846 Method 0061 procedures, with substitution for the reagent used in CARB 425 $NaHCO_3$) for improved pH control and lower detection limit.

3.2 EMISSION TEST PARAMETERS – ACUTE TOXICITY TESTING SCENARIO (1)

Emission Parameter	Sampling Method	Location	Unit No.	Replicates	Approximate Sampling Time (Min)
Multimetals (MMTL), plus Al, Fe, Mo, K, and V (2)	U.S. EPA Method 29	Stack	2	1, 2, 3	120
Hydrogen Chloride (HCl), Hydrogen Fluoride (HF),	U.S. EPA Method 5/Method 26A (Modified)	Stack	2	1, 2, 3	60 (minimum)

(1) Conditions to include operating at 80-90% of designed load (55-60 Klbs/hr) and an RMW feed rate of approximately 3 tons per hour.

(2) The Molybdenum compounds on the filter will be analyzed using scanning electron microscopy with energy dispersive X-ray spectrometry from the filter used in EPA Method 5/26A. Sampling time may increase to meet the Minimum Detection Limit of the method and analysis.

3.3 ESTIMATED DETECTION LIMITS FOR TOXIC AIR CONTAMINANTS TO BE TESTED

Note: Analytical and in stack detection limits have been provided as estimates only. The analytical detection limits are the best available pre-test estimates from the analytical laboratories. The in-stack detection limit estimates are based on the expected total sampled volume of stack gas for each test method. Actual analytical and in stack detection limits will be affected by the actual volumes of stack gas and the contents of each sample matrix, so may not exactly match these estimated values. Montrose will work up to the test dates to achieve the lowest DL's from all available laboratories and if another laboratory is found with lower DL's, for example for chlorobenzenes and chlorophenols, DEQ-CAO will be notified.

3.3.1 Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (EPA Method 23)

CAS Number	Compound	Analytical Det. Limit, pg/sample	In Stack Det Limit, ng/dscm
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	3	8.8E-4
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	4	1.2e-3
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	5	1.5E-3
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	5	1.5E-3
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	5	1.5E-3
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3	8.8E-4
3268-87-9	Octachlorodibenzo-p-dioxin (OCDD)	9	2.7E-3
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran (TcDF)	3	8.8E-4
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	3	8.8E-4
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	3	8.8E-4
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	3	8.8E-4
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	3	8.8E-4
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	3	8.8E-4
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	3	8.8E-4
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	3	8.8E-4
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	4	1.2e-3
39001-02-0	Octachlorodibenzofuran (OCDF)	9	2.7E-3

Note: The estimated detection limits shown are from Enthalpy Analytical, Wilmington NC. Actual values will vary depending on the characteristics of each sample.

3.3.2 Polychlorinated biphenyls (EPA Method 23)

CAS Number	Compound	Analytical Det. Limit, pg/sample	In Stack Det Limit ng/dscm
34883-43-7	PCB-8 [2,4'-dichlorobiphenyl]	3	8.8E-4
37680-65-2	PCB 18 [2,2',5-trichlorobiphenyl]	3	8.8E-4
7012-37-5	PCB-28 [2,4,4'-trichlorobiphenyl]	3	8.8E-4
41464-39-5	PCB-44 [2,2',3,5'-tetrachlorobiphenyl]	3	8.8E-4
35693-99-3	PCB-52 [2,2',5,5'-tetrachlorobiphenyl]	3	8.8E-4
32598-10-0	PCB-66 [2,3',4,4'-tetrachlorobiphenyl]	3	8.8E-4
32598-13-3	PCB 77 [3,3',4,4'-tetrachlorobiphenyl]	3	8.8E-4
70362-50-4	PCB 81 [3,4,4',5-tetrachlorobiphenyl]	3	8.8E-4
37680-73-2	PCB-101 [2,2',4,5,5'-pentachlorobiphenyl]	3	8.8E-4
32598-14-4	PCB 105 [2,3,3',4,4'-pentachlorobiphenyl]	3	8.8E-4
74472-37-0	PCB 114 [2,3,4,4',5-pentachlorobiphenyl]	3	8.8E-4
31508-00-6	PCB 118 [2,3',4,4',5-pentachlorobiphenyl]	3	8.8E-4
65510-44-3	PCB 123 [2,3',4,4',5'-pentachlorobiphenyl]	3	8.8E-4
57465-28-8	PCB 126 [3,3',4,4',5-pentachlorobiphenyl]	3	8.8E-4
38380-07-3	PCB-128 [2,2',3,3',4,4'-hexachlorobiphenyl]	3	8.8E-4
35065-28-2	PCB-138 [2,2',3,4,4',5'-hexachlorobiphenyl]	3	8.8E-4
35065-27-1	PCB-153 [2,2',4,4',5,5'-hexachlorobiphenyl]	3	8.8E-4
38380-08-4	PCB 156 [2,3,3',4,4',5-hexachlorobiphenyl]	3	8.8E-4
69782-90-7	PCB 157 [2,3,3',4,4',5'-hexachlorobiphenyl]	3	8.8E-4
52663-72-6	PCB 167 [2,3',4,4',5,5'-hexachlorobiphenyl]	3	8.8E-4
32774-16-6	PCB 169 [3,3',4,4',5,5'-hexachlorobiphenyl]	3	8.8E-4
35065-30-6	PCB-170 [2,2',3,3',4,4',5-heptachlorobiphenyl]	3	8.8E-4
35065-29-3	PCB-180 [2,2',3,4,4',5,5'-heptachlorobiphenyl]	3	8.8E-4
52663-68-0	PCB-187 [2,2',3,4',5,5',6-heptachlorobiphenyl]	3	8.8E-4
39635-31-9	PCB 189 [2,3,3',4,4',5,5'-heptachlorobiphenyl]	3	8.8E-4
52663-78-2	PCB-195 [2,2',3,3',4,4',5,6-octachlorobiphenyl]	3	8.8E-4
40186-72-9	PCB-206 [2,2',3,3',4,4',5,5',6-nonachlorobiphenyl]	3	8.8E-4
2051-24-3	PCB-209 [2,2'3,3',4,4',5,5',6,6 '-decachlorobiphenyl]	3	8.8E-4

Note: The estimated detection limits shown are from Enthalpy Analytical, Wilmington NC. Actual values will vary (e.g. from 2 to 6 pg/sample) depending on the characteristics of each sample.

3.3.3 Chlorobenzenes and Chlorophenols (SW-846 Method 0023)

CAS Number	Compound	Analytical Det Limit µg/sample	In Stack Det Limit ng/dscm
108-90-7	Chlorobenzene	2.5	740
(various)	Chlorophenols (various)	2.5	740

Note: The estimated detection limits shown are from Enthalpy Analytical, Wilmington and Durham NC. These are the best estimates available as of writing this test plan; lower detection may be possible. Actual values will vary depending on the characteristics of each sample.

3.3.4 Polycyclic aromatic hydrocarbons (CARB Method 429)

CAS Number	Compound	Analytical Detection Limit, ng per sample	In Stack Detection Limit, ng/dscm
91-20-3	Naphthalene	2620	514
91-57-6	2-Methylnaphthalene	11.0	2.16
83-32-9	Acenaphthene	443	86.9
208-96-8	Acenaphthylene	494	96.9
86-73-7	Fluorene	167	32.8
85-01-8	Phenanthrene	90.3	17.7
120-12-7	Anthracene	118	23.2
206-44-0	Fluoranthene	3.68	0.72
129-00-0	Pyrene	3.34	0.66
56-55-3	Benzo(a)anthracene	2.08	0.41
218-01-9	Chrysene	2.09	0.41
205-99-2	Benzo(b)fluoranthene	1.53	0.30
207-08-9	Benzo(k)fluoranthene	1.55	0.30
192-97-2	Benzo(e)pyrene	1.63	0.32
50-32-8	Benzo(a)pyrene	2.39	0.47
198-55-0	Perylene	2.76	0.54
193-39-5	Indeno(1,2,3-cd)pyrene	2.58	0.51
53-70-3	Dibenz(a,h)anthracene	2.79	0.55
191-24-2	Benzo(g,h,i)perylene	2.72	0.53

Note: The detection limits shown are from Vista Analytical- Enthalpy, El Dorado Hills, CA

3.3.5 Volatile organic compounds (SW-846 Method 0031)

CAS Number	Compound	Analytical Detection Limit, µg	In Stack Detection Limit, ng/dscm
67-64-1	Acetone	0.284	1.42E-02
71-43-2	Benzene	0.0133	6.65E-04
108-86-1	Bromobenzene	0.0083	4.15E-04
74-97-5	Bromochloromethane	0.0191	9.55E-04

75-27-4	Bromodichloromethane	0.0113	5.65E-04
75-25-2	Bromoform	0.0134	6.70E-04
74-83-9	Bromomethane	0.059	2.95E-03
78-93-3	2-Butanone (MEK)	0.144	7.20E-03
104-51-8	n-Butylbenzene	0.028	1.40E-03
135-98-8	sec-Butylbenzene	0.023	1.15E-03
98-06-6	tert-Butylbenzene	0.0151	7.55E-04
75-15-0	Carbon disulfide	0.022	1.10E-03
56-23-5	Carbon tetrachloride	0.0314	1.57E-03
108-90-7	Chlorobenzene	0.0065	3.25E-04
124-48-1	Chlorodibromomethane	0.0167	8.35E-04
75-00-3	Chloroethane	0.0401	2.01E-03
67-66-3	Chloroform	0.0175	8.75E-04
74-87-3	Chloromethane	0.0515	2.58E-03
95-49-8	2-Chlorotoluene	0.0133	6.65E-04
106-43-4	4-Chlorotoluene	0.0154	7.70E-04
96-12-8	1,2-Dibromo-3-Chloropropane	0.0316	1.58E-03
106-93-4	1,2-Dibromoethane (EDB)	0.0183	9.15E-04
74-95-3	Dibromomethane	0.0152	7.60E-04
95-50-1	1,2-Dichlorobenzene	0.0159	7.95E-04
541-73-1	1,3-Dichlorobenzene	0.0139	6.95E-04
106-46-7	1,4-Dichlorobenzene	0.0155	7.75E-04
75-71-8	Dichlorodifluoromethane	0.0452	2.26E-03
75-34-3	1,1-Dichloroethane	0.0122	6.10E-04
107-06-2	1,2-Dichloroethane	0.0113	5.65E-04
75-35-4	1,1-Dichloroethene	0.0153	7.65E-04
156-59-2	cis-1,2-Dichloroethene	0.011	5.50E-04
156-60-5	trans-1,2-Dichloroethene	0.0111	5.55E-04
78-87-5	1,2-Dichloropropane	0.0123	6.15E-04
142-28-9	1,3-Dichloropropane	0.0102	5.10E-04
594-20-7	2,2-Dichloropropane	0.0123	6.15E-04
563-58-6	1,1-Dichloropropene	0.0121	6.05E-04
10061-01-5	cis-1,3-Dichloropropene	0.0088	4.40E-04
10061-02-6	trans-1,3-Dichloropropene	0.0144	7.20E-04
100-41-4	Ethylbenzene	0.016	8.00E-04
87-68-3	Hexachlorobutadiene	0.03	1.50E-03
591-78-6	2-Hexanone	0.1065	5.33E-03
98-82-8	Isopropylbenzene	0.019	9.50E-04
99-87-6	4-Isopropyltoluene	0.022	1.10E-03
75-09-2	Methylene Chloride	0.166	8.30E-03
108-10-1	4-Methyl-2-pentanone (MIBK)	0.1041	5.21E-03
91-20-3	Naphthalene	0.0899	4.50E-03
103-65-1	N-Propylbenzene	0.0202	1.01E-03

100-42-5	Styrene	0.0121	6.05E-04
630-20-6	1,1,1,2-Tetrachloroethane	0.0092	4.60E-04
79-34-5	1,1,2,2-Tetrachloroethane	0.0324	1.62E-03
127-18-4	Tetrachloroethene	0.0105	5.25E-04
108-88-3	Toluene	0.0307	1.54E-03
87-61-6	1,2,3-Trichlorobenzene	0.0452	2.26E-03
120-82-1	1,2,4-Trichlorobenzene	0.0365	1.83E-03
71-55-6	1,1,1-Trichloroethane	0.0168	8.40E-04
79-00-5	1,1,2-Trichloroethane	0.0163	8.15E-04
79-01-6	Trichloroethene	0.0118	5.90E-04
75-69-4	Trichlorofluoromethane	0.0363	1.82E-03
96-18-4	1,2,3-Trichloropropane	0.0374	1.87E-03
95-63-6	1,2,4-Trimethylbenzene	0.0181	9.05E-04
108-67-8	1,3,5-Trimethylbenzene	0.012	6.00E-04
75-01-4	Vinyl chloride	0.0294	1.47E-03
95-47-6	o-Xylene	0.0159	7.95E-04
179601-23-1	m,p-Xylene	0.016	8.00E-04

Note: The detection limits shown are from Eurofins TestAmerica, Knoxville, TN

3.3.6 Aldehydes (CARB Method 430)

CAS Number	Compound	Analytical Detection Limit, µg per sample	In Stack Detection Limit, µg/dscm
50-00-0	Formaldehyde	0.25	8.9
75-07-0	Acetaldehyde	0.25	8.9
107-02-8	Acrolein	0.25	8.9

Note: The detection limits shown are from Atmospheric Analysis & Consulting, Ventura, CA

3.3.7 Ammonia (BAAQMD Method ST-1B)

CAS Number	Compound	Analytical Detection Limit, µg per sample	In Stack Detection Limit, µg/dscm
7664-41-7	Ammonia	100	147

Note: The detection limits shown are from Atmospheric Analysis & Consulting, Ventura, CA

3.3.8 Metals (EPA Method 29)

CAS Number	Compound	Analytical Detection Limit	In Stack Detection Limit
7429-90-5	Aluminum	15.00 µg/L	3.97 µg/dscm
7440-36-0	Antimony	5.00 µg/L	1.32 µg/dscm
7440-38-2	Arsenic	7.00 µg/L	1.85 µg/dscm
7440-39-3	Barium	0.50 µg/L	0.05 µg/dscm
7440-41-7	Beryllium	0.20 µg/L	0.13 µg/dscm

7440-43-9	Cadmium	0.40 µg/L	0.11 µg/dscm
7440-47-3	Total Chromium	0.80 µg/L	0.21 µg/dscm
7440-48-4	Cobalt	0.50 µg/L	0.13 µg/dscm
7440-50-8	Copper	5.00 µg/L	1.32 µg/dscm
7439-89-6	Iron	7.00 µg/L	1.85 µg/dscm
7439-92-1	Lead	5.00 µg/L	1.32 µg/dscm
7439-96-5	Manganese	0.30 µg/L	0.08 µg/dscm
7439-97-6	Mercury	0.007 µg/L	0.00µg/dscm
1313-27-5	Total Molybdenum	2.00 µg/L	0.53 µg/dscm
7440-02-0	Nickel	3.00 µg/L	0.79 µg/dscm
7723-14-0	Phosphorus	20.00 µg/L	5.30 µg/dscm
7440-09-7	Potassium	6.00 µg/L	1.59 µg/dscm
7782-49-2	Selenium	15.00 µg/L	3.97 µg/dscm
7440-22-4	Silver	2.00 µg/L	0.53 µg/dscm
7440-28-0	Thallium	10.00 µg/L	2.65 µg/dscm
7440-62-2	Vanadium	1.00 µg/L	0.26 µg/dscm
7440-66-6	Zinc	3.00 µg/L	0.79 µg/dscm

Note: The detection limits shown are from Enthalpy Analytical, Durham, NC. Actual values may vary depending on the characteristics of each sample.

3.3.9 Hexavalent Chromium. (SW-846 Method 0061)

CAS Number	Compound	Analytical Detection Limit	In Stack Detection Limit
--	Hexavalent Chromium	0.02 µg/sample	1.21E-2 µg/dscm

Note: The detection limits shown are from Chester Labnet, Tigard, OR

3.3.10 Hydrogen chloride, halides, and halogens. (EPA Method 26A)

CAS Number	Compound	Analytical Detection Limit	In Stack Detection Limit
7726-95-6	Bromine	200 µg/sample	59 µg/dscm
7782-50-5	Chlorine	200 µg/sample	59 µg/dscm
7647-01-0	Hydrochloric acid	200 µg/sample	59 µg/dscm
10035-10-6	Hydrogen bromide	100 µg/sample	29 µg/dscm
7664-39-3	Hydrogen fluoride	100 µg/sample	29 µg/dscm

Note: The detection limits shown are from Enthalpy Analytical, Durham, NC

4.0 SCHEDULE OF ACTIVITIES

4.0 SCHEDULE OF ACTIVITIES (1)

Day	Unit/Location	Parameter	Reference Method	Replicates	Sampling Time (Minutes)
0 – Dec 6	--------------------	Setup			
1 – Dec 7					
	1 Stack	HCl, HF, HBr, Cl2 & Br2	EPA 26A (Modified)	1, 2, 3	60
	1 Stack	SLO-SMVOC and SMVOC (4)	EPA SW-846 0031	1, 2, 3	120
	2 Stack	MMTL, plus Al, Fe, Mo, K, and V (2)	EPA 29	1, 2, 3	120
	2 Stack	Chromium VI (3)	EPA SW-846 0061	1, 2, 3	120
2 – Dec 8					
	2 Stack	Ammonia	BAAQMD ST1B	1, 2, 3	60
	2 Stack	Formaldehyde, acetaldehyde, acrolein	CARB 430	1, 2, 3	60
	2 Stack	Chlorobenzene, Chlorophenol	EPA SW-846 0023a	1, 2	240
	1 Stack	PCDD/F, PCB	EPA 23	1, 2	240
	1 Stack	PAH	CARB 429	1, 2	240
3 – Dec 9					
	1 Stack	PCDD/F, PCB	EPA 23	3	240
	1 Stack	PAH	CARB 429	3	240
	1 Stack *	Chlorobenzene, Chlorophenol	EPA SW-846 0023a	3 *	240
	2 Stack (5)	MMTL, plus Al, Fe, Mo and V	EPA 29	1, 2, 3	120
	2 Stack (5)	HCl, HF	EPA 26A (Modified)	1, 2, 3	60 (minimum)

* Runs 1 and 2 on Stack 2, then Run 3 on Stack 1 after completion of the EPA 23 and CARB 429 test runs.

(1) Schedule may be changed during testing to accommodate site conditions and/or contractor availability. Every effort will be made to keep CAO/ODEQ informed of any schedule changes.

(2) Multi-metals include target metals for Method 29. Additional metals not listed in Method 29 but referenced in OAR 340-245-8020 to be analyzed include aluminum, iron, potassium, and vanadium. The Molybdenum compounds on the filter will be analyzed using scanning electron microscopy with energy dispersive X-ray spectrometry.

(3) Hexavalent chromium testing will follow EPA SW-846 Method 0061 procedures, with substitution of $NaHCO_3$ solution in place of the KOH solution cited in the Method.

(4) SLO-VOC will test for bromomethane, chloroethane, vinyl bromide, and vinyl chloride.

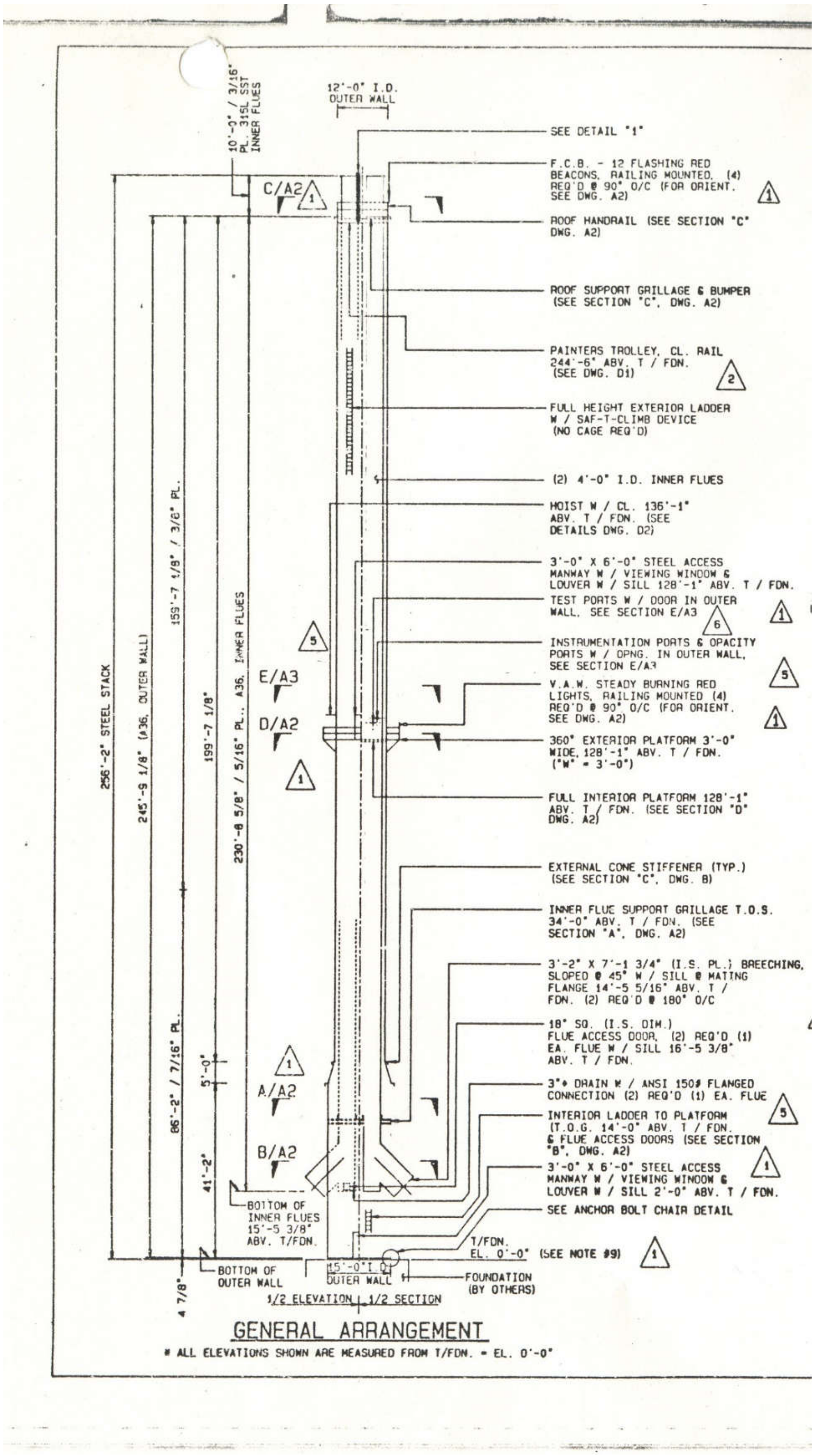
(5) Acute toxicity testing with unit load at 80-90% of design.

5.0 SAMPLING AREA DESCRIPTIONS

5.0 SAMPLING AREA DESCRIPTIONS

The outlet sampling area at Covanta Marion, Inc. (CMI) is located on a platform 128 feet above the ground outside of the steel stack (see Figure 1). The stack is equipped with a rope and pulley to facilitate hauling equipment up and down. The ladder is equipped with a Saf-T-Climb® climbing device. Each stack has two 4 inch diameter test ports at 90° and one 4 inch single port available.

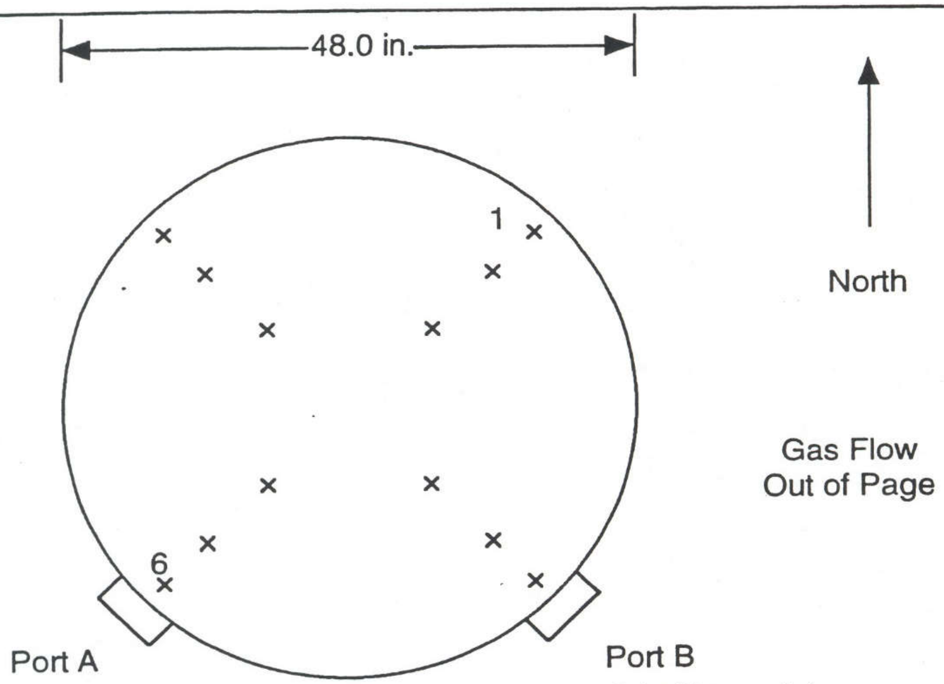
	<u>Sampling Area Parameters</u>
Testing platform elevation above ground:	128 ft.
Test ports elevation:	131 ft.
Test ports flange size:	4 in.
Flue diameter:	4 ft.
Nearest downstream disturbance:	120 ft.
Nearest upstream disturbance:	100 ft.



Figures 2 and 3 depict the sampling point determinations.

METHODOLOGY

SAMPLING POINT DETERMINATION (CONTINUED)



Traverse Point	Port to Point Distance (in.)
1	45.9
2	41.0
3	33.8
4	14.2
5	7.0
6	2.1

CEM Sampling Point	Port to Point Distance (in.)
1	40.0
2	24.0
3	8.0

Diameters to upstream disturbance: >8 Limit: 2
Diameters to downstream disturbance: >2 Limit: 0.5

Units 1 and 2 Stack Sampling Point Determination (EPA Method 1)

Figure 3

6.0 TEST METHODS DESCRIPTIONS

6.1 Sampling and Analytical Methods

This section briefly describes the sampling and analytical procedures that are used and any deviations from the methods. The planned methods, techniques and laboratories have been chosen to provide the lowest feasible detection limits for the planned test run times and sampled volumes. For example:

- EPA Method 23 will be used to measure Dioxins, Furans and PCBs.
- A separate sampling train will be operated (according to SW-846 Method 0023) to measure chlorobenzenes and chlorophenols. This will be done to eliminate the need to "split" the samples in the laboratory, to provide lower detection limits for all the analytes.
- Another separate sampling train will be operated (according to CARB 429) to measure PAH compounds. Again, this will be done to provide lower detection limits.

The EPA Method 29 analysis does not discern the metal compounds present, as it measures only each sample's total amount of each analyzed metal. Since Molybdenum Trioxide is a target analyte, a non-destructive analysis will be conducted on each Method 29 filter before the filter is processed for the Method 29 analysis. The non-destructive analysis will include scanning electron microscopy with energy dispersive X-ray spectrometry, which can discern and count Mo Oxides relative to Mo Chlorides and MoS2 (and other Mo compounds). The analysis cannot tell MoO2 apart from MoO3, but should provide a reasonable estimate of the fraction of the total Mo that is Mo oxides versus other phases. Note that Mo complexed with Fe can make identification difficult, and that could increase the uncertainty of the analysis.

The Mo oxide fraction will be used (with the Method 29 result for total Mo from each test run) to calculate a conservative estimate of the emissions of Molybdenum trioxide.

EPA Methods 1-4. EPA Methods 1 through 4 are utilized in conjunction with each isokinetic test method. EPA Method 1 is used to determine the location of the sampling points. EPA Method 2 is used to measure the flue gas flow rate. EPA Methods 3A/3B are used to determine the flue gas molecular weight. EPA Method 4 is used to determine the flue gas moisture content. The information provided by these methods is used in determining isokinetics, parameter concentrations, and parameter emission rates.

EPA Method 23. The concentrations and emissions rates of polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDF), polychlorinated biphenyls (PCB), chlorobenzene, and chlorophenol are determined utilizing the proposed revision to EPA Method 23 from the January 2020 Federal Register. The proposed EPA Method 23 sampling train consists of a glass nozzle, a heated glass probe liner, a heated glass fiber filter, a condenser, an XAD resin trap, four chilled impingers in series (the knock out impinger will be omitted as provided for in the proposed revisions to EPA Method 23) , a dry gas metering console and a calibrated orifice. A heated sample transfer line of Teflon tubing may be used between the filter holder and the condenser, as described in Section 2.1.2 of Method 23. The first and second impingers contain ~100mL of DI water, the third is empty, and the fourth impinger contains pre-weighed silica gel. The weight of each impinger and the adsorbent module, including the fitting caps will be recorded to the nearest 0.5 g before and after sampling. The equipment is operated in accordance with proposed EPA Method 23 with no exceptions. Each test run is four (4) hours in duration.

At the end of each test run, each impinger and the XAD adsorbent module is weighed to compare with pre-sampling weights for determination of the stack gas moisture content (i.e. EPA Method 4). The samples are recovered, processed and analyzed in accordance with proposed EPA Method 23. The samples are extracted and concentrated in the laboratory, then analyzed by High-Resolution GC with High-Resolution Mass Spectroscopy for PCDD/PCDF and PCB. Results are converted to stack concentrations (ng/dscm or pg/dscm) and mass emission rates (e.g. lb/hr) for reporting.

EPA SW-846 Method 0023a. The concentrations and emissions rates of chlorobenzene and chlorophenol are determined utilizing the proposed revision to EPA Method 23 from the January 2020 Federal Register. The sampling train consists of a glass nozzle, a heated glass probe liner, a heated glass fiber filter, a condenser, an XAD resin trap, four chilled impingers in series, a dry gas metering console and a calibrated orifice. A heated sample transfer line may be used between the filter holder and the condenser. The first and second impingers contain ~100mL of DI water, the third is empty, and the fourth impinger contains pre-weighed silica gel. The weight of each impinger and the adsorbent module, including the fitting caps will be recorded to the nearest 0.5 g before and after sampling. The equipment is operated in accordance with proposed EPA Method 23 with no exceptions. Each test run is four (4) hours in duration.

At the end of each test run, each impinger and the XAD adsorbent module is weighed to compare with pre-sampling weights for determination of the stack gas moisture content (i.e. EPA Method 4). The samples are recovered, processed and analyzed in accordance with SW-

846 Method 0023a. The samples are extracted and concentrated in the laboratory, then analyzed by Gas Chromatography - Mass Spectroscopy (GC-MS) according to EPA Method 8270D for its list of calibrated Semi-Volatile Organic Compounds, which includes some of the chlorobenzenes and chorophenols. The analysis includes a scan to measure the top ten ten tentatively identified compounds (TIC) to include any additional chlorobenzenes and chlorophenols (Chlorobenzene may be too volatile to be captured, but will be captured and analyzed in the Method 0031 samples). Results are converted to stack concentrations (ng/dscm or pg/dscm) and mass emission rates (e.g. lb/hr) for reporting.

CARB Method 429. The sampling and analytical procedures outlined in CARB Method 429 are used to determine the polycyclic aromatic hydrocarbons (PAHs) emissions.

Sampling Train Description. The sampling train consists of a glass nozzle, a heated probe with a glass liner, a heated Teflon-coated glass fiber filter, a water-cooled condenser, a XAD sorbent trap, four chilled impingers in series, a pump, a dry gas meter and a calibrated orifice. A sample transfer line (Teflon tubing) may be used to connect from the filter holder to the condenser. The filter is housed in glass filter holder and supported on a Teflon frit. The condenser is placed above the XAD sorbent trap allowing the condensate to drain vertically through the sorbent for removal of the organic constituents in the gas. The sorbent trap is charged with the precleaned, spiked resin. The first and second impingers each are charged with sodium carbonate/sodium bicarbonate buffer solution, the third is empty and the fourth contains silica gel. Sealing greases are not used on the sample train connections.

The samples are recovered, processed and analyzed in accordance with CARB Method 429. The samples are extracted and concentrated in the laboratory, then analyzed by high resolution capillary column gas chromatography coupled with high resolution mass spectrometry (HRGC/HRMS) for the PAH compounds. Results are converted to stack concentrations (ng/dscm) and mass emission rates (e.g. lb/hr) for reporting.

EPA Method 26A (Modified). Concentrations of Halogens and halides are measured using EPA Method 26A with isokinetic sampling. This provides sampling similar to Method 26 but using full-size impingers and the larger sampled volume in place of the midget impingers and smaller sampled volume of Method 26.

The following will also apply:

1.) The probe & filter must be kept above the exhaust temperature and greater than 248°F.

2.) A separate blank solution of the absorbing reagent should be prepared for analysis with the field samples.

3.) At a minimum, results of testing are to be reported in the following units. Test results shall be reported as not blank corrected.
   - ppmdv
   - ppmdv @ 7% O_2
   - lb/hr (outlet only)
   - lb/1,000 lbs of steam produced

The equipment is operated in accordance with EPA Method 26A except that:

- The sampling will be conducted at a constant sampling rate rather than at isokinetic sampling rates,

- The sampling probe may be a “straight” tube rather than including a nozzle for isokinetic sampling.

- The sampled volume will be measured using a “Method 5” style dry gas meter console.

Each test run will be 1 hour in duration.

At the end of each test run, each impinger is weighed to compare with pre-sampling weights for determination of the stack gas moisture content (i.e. EPA Method 4). The contents of the H_2SO_4 impingers are recovered into one sample bottle, and the contents of the NaOH impingers are recovered into a separate sample bottle for each test run.

The full load test samples are analyzed in accordance with EPA Method 26A for the halides and halogens identified in Section 1.1 of EPA Method 26 (i.e. HCl, HBr, HF, Cl_2 and Br_2), but the low load tests samples will only be analyzed for the halides (HCl and HF).

.

EPA Method 29. Metal concentrations and emission rates are determined utilizing EPA Method 29. The EPA Method 29 sampling train consists of a glass nozzle, a heated probe with a glass liner, a heated (low-metal blank) quartz filter, an empty impinger (optional), two chilled impingers each with 100mL of 5% HNO_3/10% H_2O_2, an empty impinger, two chilled impingers each with 100mL of 4% $KMnO_4$/10% H_2SO_4, an impinger with a known mass of of silica gel, and a dry gas metering console. Each test run is a minimum of two (2) hours in duration. Borosilicate glass or quartz probe liners and nozzles are used to avoid possible contamination.

After completion of each test run, each impinger is weighed to compare with pre-sampling weights for determination of the stack gas moisture content (i.e. EPA Method 4). The samples are recovered, preserved, processed and analyzed in the analytical laboratory in accordance with EPA Method 29.

The Method 29 filter from each test run (and a reagent blank filter) will be sent first to a laboratory for non-destructive analysis of the Molybdenum compounds. The non-destructive analysis will include scanning electron microscopy with energy dispersive X-ray spectrometry, which can discern and count Mo Oxides relative to Mo Chlorides and MoS2 (and other Mo compounds). The results of the analysis will be used to estimate the fraction of the total Molybdenum emissions that may be Molybdenum Trioxide. After completion of the non-destructive analysis, the filters will be sent to the separate laboratory for processing by EPA Method 29 along with the other Method 29 sample fractions.

EPA SW-846 Method 0061. Hexavalent chromium emissions will be determined using the SW846 Method 0061, modified to use a different impinger solution. The sampling train will consist of a glass nozzle, Teflon probe liner with Teflon aspirator, four Teflon impingers and one glass impinger connected in series, a leak-free sampling pump assembly and a dry gas metering console.

The impingers will be charged as described in Section 7.1.4 of Method 0061, except that the 0.1M KOH will be replaced by 0.1M sodium bicarbonate solution. Recent sampling and laboratory practice has evolved to improve the maintenance of the valence state of the hexavalent and trivalent chromium and to provide lower blank values. The bicarbonate solution has been found to have non-detectable chromium content, even at laboratory detection limit of 0.01 μg/L. The solution also improves the maintenance of the proper pH range during sampling, as studies have shown that low pH drives hexavalent chromium to the trivalent state, and high pH drives trivalent chromium to the hexavalent state. The bicarbonate solution facilitates maintenance of the pH in the 8.5 to 10 range that is ideal for valence-state maintenance.

At the completion of each test run, the pH of the solution in the first impinger is determined (and recorded) using pH indicator strip. If the pH is not above 8.5, the solution is discarded. If the pH is above 8.5, the impingers are purged for 30 minutes with N_2 at a rate of 10 liters/min. At the conclusion of the N_2 purge, the contents of the impingers are recovered into a sample container. The entire sampling train up to the silica gel impinger is rinsed with DI water into a sample container. The sample is filtered through an acetate membrane filter with a 0.45 um pore size. Nitrogen is used to accelerate the filtering period. The filtered sample is then placed into a chilled ice chest for storage and transport to the analytical laboratory.

The samples are analyzed in accordance with SW846 Method 0061 by Chester LabNet of Tigard, Oregon. Chester's SOP for the method includes important updates that provide a detection limit of 0.01 µg/L (as compared with older techniques that have a typical detection limit of 0.5 µg/L).

EPA SW-846 Method 0031. Concentrations of volatile organic compounds are measured using a single sampling train for SW-846 Method 0031 The system includes a sampling rate of 0.5 L/min for 40 minutes as in the "SLO-SMVOC" criteria to collect the very volatile compounds without significant breakthrough (i.e. less than 5% in the final Tenax trap). Three such samplings are made during each 120-minute test run, with trap changes between samplings. A separate fourth 40-minute sampling run may be made to provide a "spare" set of traps to archive for each test run in case of issues with any of the normal set of three. The only compounds not analyzed by 0031 are Ethylene, Propylene and 1,3-Dichloropropene; measurement of these may be provided by a TIC scan by EPA Method 8270. A list of the normally applicable compounds is available in Section 1.1 of the method.

The method employs a sampling module and meter box to withdraw a 20-L sample of effluent gas containing volatile organic compounds from a stationary source at a flow rate of 0.5 L/min, using a glass-lined probe heated to 130 ± 5°C and a "Sampling method for volatile organic compounds" (SMVOC) train. The gas stream is cooled to 20°C by passage through a water-cooled condenser and volatile organic compounds are collected on a set of sorbent traps (Tenax®-GC/Tenax®-GC/Anasorb®-747). Liquid condensate is collected in an impinger placed between the two Tenax®-GC traps and the Anasorb®-747 trap.

Sample fractions are recovered, stored, shipped and analyzed as described in Method 0031.

CARB Method 430. Sampling and analysis are conducted in accordance with CARB Method 430, modified to include sampling and analysis of acrolein and to mitigate interference from NO_X in the stack gas. Gaseous emissions are drawn through a probe and sample line (tubing) and two impingers in series, each impinger containing an aqueous acidic solution of 2,4-dinitrophenyl-hydrazine (DNPH). The sampling train includes a probe of heated glass or Teflon tubing, a connecting sample line of Teflon tubing, the two impingers, vacuum pump, control valves and dry gas meter.

Modifications for sampling include the use of a calibrated liter-range dry gas meter to measure the volume of sampled dry stack gas (in place of the rotameter described in the Method, as the rotameter measures only the sampling rate). Note that the meter box includes a rotameter or similar device for measurement of the sampling rate so that the rate will be no higher than 500 ml per minute.

Sampling is also modified by the addition of a toluene “float” to each DNPH impinger. This modification has been well-studied by several researchers and has become common practice among testers who routinely use CARB Method 430. The modification prevents interference from NO_X, allows accurate measurement of acrolein, and provides immediate, continuous extraction to stay within the 7-day hold-time for extraction described in Section 8.3 of Method 430.

Approximately 2 to 5 ml of toluene is added to each DNPH impinger prior to sampling and is recovered from the impinger with the DNPH solution. This modification provides continuous extraction of the hydrozone derivatives (formed from the aldehydes reacting with the DNPH) as the samples are collected. Since the derivative for acrolein is not water-soluble, it is continuously extracted into and preserved in the toluene; this allows for accurate laboratory analysis of the acrolein content (which would not be possible using the Method as written). The continuous extraction of the other derivatives (from formaldehyde and acetaldehyde) into the toluene prevents interference from NO_X, as the reactions with NO_X take place only in an aqueous solution.

At the completion of sampling, the probe is rinsed with 2 ml of impinger solution into the first impinger. Each impinger is recovered separately into a glass sample vials with a gas tight lid and each impinger is rinsed with 2 ml of impinger solution. An aldehyde reacts with DNPH by nucleophilic addition on the carbonyl followed by 1,2- elimination of water and the formation of a 2,4-dinitrophenylhydrazone. Acid is required to promote protonation of the carbonyl because DNPH is a weak nucleophile. After organic solvent extraction, the sample is analyzed using reverse phase HPLC with an ultraviolet (UV) absorption detector operated at 360 nm. Impingers are analyzed separately. Formaldehyde and acetaldehyde in the sample are identified and quantified by comparison of retention times and area counts of sample extracts with those of standards.

Bay Area Air Quality Management District (BAAQMD) Source Test Procedure ST-1B.
The sampling procedures outlined in BAAQMD Method ST-1B is used to determine the ammonia emissions. The sampling train consists of a heated glass or titanium probe liner, a heated borosilicate glass filter holder with a Teflon filter support, four chilled impingers in series, a pump, a dry gas meter and a calibrated orifice. The impingers are placed in an ice bath to maintain the impinger temperature at 45^{o} F or less.

All glassware is precleaned by washing with soap, hot tap water and rinsed with deionized water. For sampling, the first two impingers are each charged with 100 ml of 0.1 N hydrochloric acid (HCl). The third impinger is empty, and the fourth impinger contain silica gel. The leak check and sampling procedures are performed according to the method. Each impinger is weighed before and after sampling.

The contents of the first impinger are transferred to a Nalgene sample bottle. The contents of the second impinger are transferred to a separate Nalgene sample bottle.
The samples are delivered to the laboratory for separate analysis of the first and second impinger contents for the ammonia concentrations using a calibrated ion specific electrode.

7.0 QUALITY ASSURANCE / QUALITY CONTROL

7.0 QUALITY ASSURANCE / QUALITY CONTROL

Covanta has instituted a rigorous Quality Assurance/Quality Control (QA/QC) program for all its compliance source testing. This program ensures that the emission data reported for Covanta facilities are as accurate and meaningful as possible.

Glass or Teflon® is employed in all the sampling equipment in contact with the sample gas. This includes the nozzle, probe liner, filter housing, sample line and impingers. Calibration of all gas meters, thermocouples, and pitot tubes used in the test program will be performed using reference methods with calibration sheets included in the final report.

Transportation blanks, method blanks, inert sample containers, field data and chain of custody forms from the U.S. EPA QA Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, EPA-600/4-77-027b, are used during all phases of the test program.

All test programs include a supervising engineer from Covanta's corporate office to ensure the integrity of the test program according to the Source Test Plan. All field data sheets for each test run listed in the source test plan including any aborted test runs will be included in the final test report. The draft report with laboratory analyses will be available to CMI within 25 calendar days following the completion of testing.

8.0 OPERATIONAL PARAMETERS

8.1 OPERATIONAL PARAMETERS

During the source testing, plant process data will be monitored and collected by Covanta personnel to ensure representative operation of the facility. Steam flow rate will be documented to ensure representative heat input at design conditions.

The following operating parameters will be included in the final report:

Steam Production: Steam Flow (lb/hr)

> Steam Flow will be measured and reported for all test runs. Reduced steam load (i.e. low fire) will be 80-90% of design steam load capacity and increased/normal steam load (i.e. high fire) will be 90-110% of design steam load capacity.

Temperature: Baghouse Inlet

Lime slurry feed rate: dry lbs/hr

Ammonia injection rate: gal/hr

Air Pollution Control: Carbon Feed Rate (lb/hr to each unit)

Supplemental fuel usage during the tests, if used

Municipal Solid Waste totals during testing

Regulated Medical Waste :

> Regulated Medical Waste (RMW) is composed of several subcategories, which include pathology, trace chemotherapy, pharmaceuticals, sharps, and biohazardous waste. Due to state-specific requirements for treatment technologies, CMI primarily processes pathology, trace chemotherapy, and pharmaceutical wastes. These wastes are packaged in either U.S. Department of Transportation (DOT) approved single-use packaging or reusable packaging. Processing of single use packaged RMW will likely contain higher quantities of plastic and corrugated cardboard. CMI does not refer to either packaging or waste type as 'grey bin' or 'blue bin.' In addition, this terminology is not identified in any regulatory context. CMI will track volumes of medical waste processed and will differentiate between single-use and reusable packaging for reporting purposes.

- Packaging type (reusable or single use)
- Number of containers or pallets
- Total tons processed

Liquid Direct Injection (LDI) waste totals during testing to include:

- Waste description
- Approximate injection rates
- Total tons and/or gallons processed

- Analysis of leachate injected during the testing
  - Chloride – Method 300.0 – Data already obtained for LDI
  - Total Metals – Method 6020A - Data already obtained for LDI
  - Total Halogenated Organics – Method 9020B - As Andrew indicated, additional data may be required for Total Halogenated Organics - Method 9020B

<u>Supplemental waste (also referred to as Special waste) during testing to include</u>:

- Waste description
- Total tons received

9.0 SOURCE TEST RESULTS

9.1 SOURCE TEST RESULTS

Source test results will be submitted to the ODEQ Agency Headquarters, 700 NE Multnomah Street, Suite 600, Portland, OR 97232 within 60 days following the completion of the source test.

Emissions to be tested shall be reported as:

PCDD/PCDF:	ng/dscm @ 7% O_2, lb/hr, lb/1000lb steam
PCBs:	ng/dscm @ 7% O_2, lb/hr, lb/1000lb steam
PAHs:	ng/dscm @ 7% O_2, lb/hr, lb/1000lb steam
VOCs:	ppb @ 7% O_2, lb/hr, lb/1000lb steam
Metals:	mg/dscm @ 7% O_2, lb/hr, lb/1000lb steam
Hydrogen chloride, halides, and halogens:	ppm @ 7%, lb/hr, lb/1000lb steam
Formaldehyde and other aldehydes:	ppm @ 7%, lb/hr, lb/1000lb steam
Ammonia:	ppm @ 7%, lb/hr, lb/1000lb steam
Chlorophenols:	ng/dscm @ 7% O2, lb/hr, lb/1000lb steam
Chlorobenzenes:	ng/dscm @ 7% O2, lb/hr, lb/1000lb steam
Molybdenum chloride and trioxide	weight percentage of solid particulate matter and of total Mo, lb/hr, lb/1000lb steam

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If you have any questions, please contact one of the following individuals by email or phone.

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